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Midnight Engineering

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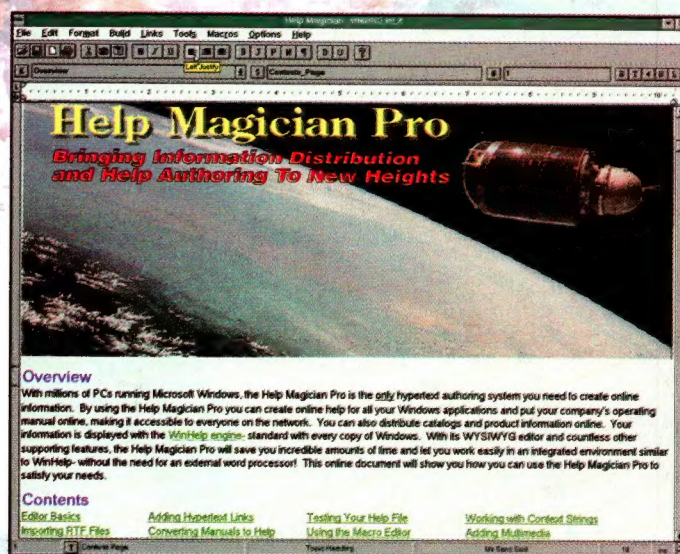
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ME is dedicated to those individuals interested in creating, developing, producing, and distributing high technology products. The content is meant to address the individual and small enterprise, their entrepreneurial issues and opportunities, and the technology they use now and will use in the near future. The magazine is designed around the concept of "a half-dozen entrepreneurial engineers sitting around having a beer." Topics will range from embedded systems technical details to software and hardware design. A particular issue might cover biotechnology or nanotechnology just as well as everyday personal business such as taxes or time management and productivity. Quite simply, ME reflects the exchange of experience, insight, and concerns of today's entrepreneurial engineer.

This magazine was developed, edited, produced, and published by one person — there is no editorial or production staff involved at any time. The contributors are entrepreneurial engineers and their submissions are not intended to set any literary highwater marks.

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Cover: Charles Ostman has rendered a 3D raytraced scene depicting a "nano cruiser" machine adrift as it hovers over a nanoscale environment. See more of Charles' "nano" world and an update on nanotechnology at ENTCON '95. — WEG

Midnight Engineering

Resources and Insight For The Entrepreneurial Engineer

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Letters to ME

ENTCON 94/95

I wanted to give you a quick update from my presentation last year at ENTCON '94. I discussed organization, employees, customer, and finances involved in running a "Virtual High Technology Manufacturing Company."

During my presentation I was predicting \$2 million in sales as one goal, plus a few more patents and such. My company, The Atlanta Technology Group, has only made roughly \$1.5 million dollars of that estimate. I am currently transferring assets from my sole proprietorship to a newly formed C corporation of the same name and I have only 1 full time employee: myself. I look forward to ENTCON 95 and discussing the intricacies of new and continuing operations of a "Virtual High Technology Company." Nowhere else do I get the opportunity to meet so many technical entrepreneurs as at ENTCON and I do not intend to miss any in the future. For those who missed ENTCON 94, my recommendation is to make this event one that their schedule every year. No place else can you find such a varied group of innovative and creative technical individuals. I personally intend to apply some of the director marketing knowledge that I picked up last year and I can testify as to the importance of many of the financial aspects brought up by last year's speakers.

Jack Eckles
Atlanta Technology Group
Atlanta, GA

Academic Entrepreneur

I just finished reading cover-to-cover the last six issues of ME which had been piling up for a year! I have gone back to the world of Academia to become an administrator of sorts. I have midnight engineered (intrapreneured) a new graduate Masters Program in Nurse Anesthesia, using many of the principles I learned from having my own one-man computer graphics imaging/consulting business, and from reading ME.

I started 4 years ago with 2 parttime faculty and 3 students. I now have 49 students and 4 full-time faculty. I did it all by myself, by bootstrapping, without ever going into the red and with no startup funds. It's been fun, but now it's running smoothly and I'm bored. I suspect that there are two kinds of people: those of us who start and build new enterprises, and those others who enjoy managing an existing enterprise, and keeping it going. I am definitely the former, as are most of our kind.

That's why I picked up the old MEs. Now I'm thinking about designing personal robots (walking machines), embedded controllers, and other fun topics.

I enjoy your venture into Accidental Publishing and the RFPC. I hope you will continue to share your experiences. It is inspirational to hear about the adventures of other kindred spirits. Keep up the good work and I hope you get Email soon or share why you don't want it.

Carl Spirito
Saco, ME

[I continually consider getting online for email, but I simply don't find it compelling. Your fax got to me just fine and I wouldn't mind at all if you called me sometime.—WEG]

Student Midnight Engineer

I am a Business Administration student at Western Washington University who enjoys receiving second hand copies of your magazine from an engineering friend. Your magazine helps improve my knowledge of technological products and gain insight and motivation into dealing with entrepreneurial problems with a positive attitude.

Just before Christmas, mom scribbled you a check for a subscription to ME along with a letter. She asked if you could send some proof that I would be getting a subscription to ME. It impressed me that you mailed a copy of your magazine by second day mail with a "do not open until Christmas" written on it. I realize that you can't do this for everyone who asks, but what a personal touch! It was appreciated.

Jayson Estby
Eatonville, WA 98328

Math Tricks

I must comment on the *Multiple Meters and Budget 'Bots* article in the Sep/Oct '94 issue of ME. I cannot agree with the averaging trick described there.

Statistics can be [ab]used for many purposes. In engineering, statistics are mainly used for removing random noise. Absolute accuracy is determined by your hardware. You cannot increase accuracy through statistical methods. If this could be done, what would stop me from making a 1-bit A/D converter and measuring 65,563 times. According to James' principle, this would yield a 16-bit ADC. I think it will be obvious to anyone that this of course will never be the case.

If, and only if, you have a 12-bit ADC, can you get 12-bit accuracy. You can never ever squeeze a 13th bit out of it. However, I do understand what made James make his mistake. If you must measure a signal, that has 4 LSBs of noise with a 12-bit ADC, the overall accuracy of the measurement looks to be 8-bit. Now, averaging will supply extra bits. By using statistics in such a case, you can come close to the 12th bit again. But you won't get bit 13. In fact, you can call yourself lucky when you ever get bit 11.

Regarding the HP DMM used. Knowing HP, I expect this meter to have a resolution of 8 digits or more and just a 6 1/2 digits display. In such a case, the nifty math tricks will work just fine.

Jan Verhoeven
The Netherlands

Single-Handed Operation

I started my own business (developing/marketing of electronic kits) back in 1989 and have been running it single-handedly for several years now. I am absolutely ecstatic with both your magazine and your — to borrow a line from another reader — "vision." In fact, I plan on including a paragraph in my will which will state that my subscription should be continued an additional 10 years after my departure, whenever that occurs.

Because the products I sell are in kit form and assembled by my customers, technical support demands my attention tenfold. In turn, I correspond with many people every day

Letters to ME

(night, breakfast, and dinner time). I do not charge for technical support, and in fact, though I do not advertise it, I even repair those kits assembled by customers who have made an honest but failing attempt, for free. This is not necessarily a service I "expect" will lead to future orders, rather than it is to satisfy the saying: "if it feels good..."

To get to the point, 99.9% of my customers are some of the best people there are, and I have really enjoyed corresponding with them. I always feel proud to bend over backwards for them. But, every once in a while, I get a letter from a customer who just plainly "doesn't get it." That kind of person is not going to be satisfied until I compensate him for a tragic event in his childhood. When I read those "negative" letters you printed in the Jan/Feb '95 issue of ME, I just had to smile.

I really enjoy your magazine

Terry Weeder
Batavia, OH

[Like Terry, I did some kits as initial products when I started out. I think it is one of the best ways for an Entrepreneurial Engineer to bootstrap and to learn about everything from product design and production to marketing, advertising, sales, and technical support. Terry sent along a nifty little catalog of his kits, which include some really interesting projects like a Voice Filter to kill the voice track from recordings and a mixer that will do the opposite, plus various telephone add-ons like DTMF decoder, caller-ID, and a telephone scrambler. Terry's catalog is simple, but to the point, and done quite nicely with good black and white photos of the kits assembled. I thought that if I had continued down the road I was on with my kit products, I would have created just such a catalog. If you can find the time Terry, please consider writing us an article about your Entrepreneurial Engineering. I see, all too often, that engineers want to do something far too grandiose compared with their experience and abilities. The typical engineer has no respect for the marketplace and the need to learn the basics and pay their dues like Terry has by walking through the same steps, on a small scale, that IBM has to do when it wants to put something on the market. Terry represents what is really great about this country: There is so much opportunity, in so many areas, that can be addressed by an entrepreneur with little or no capital and an interesting idea. So, for being a classic Midnight Engineer according to my definition, Terry wins a free plug here. I think his \$30 to \$50 kits would make much more sense as Christmas or birthday gifts for children or grandchildren today than most of the "technical" consumer nonsense that is so powerfully marketed. Many readers may find these little projects to be the modern equivalent of the electronics shop classes we used to have in junior and senior high school before education made a left turn somewhere around 1970. Readers can get a free catalog from Terry and order his products directly by calling him at 513-752-0279 or write to him at POB 421, Batavia, OH 45103.]

More FUELMAX fallout

Thanks for your sophisticated response to the recent letter from Grimes Slaughter regarding the ad that you ran for FUELMAX in the NOV/DEC '94 issue. Mr Slaughter writes

from Oak Ridge and my experiences with Oak Ridge have been uncomfortable. These people live in a world created and perpetuated by the massive spending of government agencies.

Within 400 miles of Oak Ridge is a firm that has been very successful with rare earth super conducting magnets to modify gasoline, diesel fuel, heating oil and water. Their research and our field experience reveals the magnetized fuel cleans and allows the orifice's original function to occur. On smoking diesels, I have seen busses go from dense black smoke to virtually no smoke in about 750 miles. The same would occur if the injectors were ultrasonically cleaned. Overall, this is a cheaper approach which has not thus far been accepted by the appropriate parties. Applied to water, the liquid is "soft water like." This is old Russian technology which has been enhanced by the new families of more powerful magnets. On fuel lines, the secret is 3/4 square inch or more of two north-pole-facing magnets arranged at 90 degrees to one another and exposed to a rubber hose or plastic line. The gauss must be 200 or more.

I spend more time evaluating technologies like this than I do products derived from the technologies manifested in your publication. I plan to attend ENTCON 95, see you there.

Jim Soudriette
The Galaxy Organization Ltd
Phoenix, AZ

Notes From South Africa

This year might be the year I make it to ENTCON. Please send information on the conference. I would like to visit my suppliers in the USA and return through Europe.

I have been reading your magazine for three years and paying dearly for it (the local newsagents are ripping us off). This is one of many American and British magazine I get every month, but definitely THE one I read from cover to cover the day I get it and continually refer to it. Incidentally, the Nov/Dec '94 issue only appeared on the newsstands here during the last week of February 1995. I think I would like to subscribe to ME for the longest duration possible and receive it Air Mail.

A lot of the articles you publish make me think "me too," and I feel I have an empathy with most of the authors. There are, however, unique elements to doing business in a foreign country. Would you be interested in an article exposing the point of view of a foreign customer dealing with American companies? This would give some food for thought after Don Lancasters column in Jly/Aug '94 and John Foust's Letter in the Nov/Dec '94 issue.

I would like to make your advertisers aware of the fact that toll free numbers can't be reached from most countries out of the USA/Canada, so it would be useful if they advertised non-800 phone and fax number and Email addresses.

Best Regards from Sunny South Africa
Daniel Carollo
Computing Technologies
Westering, South Africa

[The article sounds great and I look forward to meeting you at ENTCON '95. This is one of several faxes I have received out of South Arica recently.]

Compulsive Confidence

Without the Compulsive part, a person would have a hard time sustaining a continuous level of boldness. Without boldness, there can be little progress against the unknown. And, without progress against the unknown, there will be very little true innovation.

But where does such confidence come from? Or, perhaps the more clinical question is: How does a person go about developing and controlling such a productive neurosis? We can probably assume — given the bell-shaped curve — that about 10% of the population is afflicted to some degree. This just happens to be the percentage of the population that I have observed to be entrepreneurial.

Compulsive Confidence is not simply a strong desire to — or being driven to — achieve. In fact, most driven Type A personalities do not have an enduring confidence. Look close enough and you'll find the heavy-duty Type A is driven by a real neurosis, like guilt, fear, or never having been able to achieve enough to get that needed approval from their father or mother.

I've seen real confidence in two forms. First is where a situation is complex enough that it takes years for the student to master all forms of the situation. The student learns to identify each situation as a discrete entity. When the student becomes a master, he is able to simply overlay the appropriate "whatever" and handle the situation. To the beginning student and the casual observer, the master appears to have not only confidently fielded the situation, but was somehow able to "see" what was going to happen before it happened.

My favorite example of this is the older and more experienced brokers who handle the opening in a large futures market like Corn or Soybeans on the Chicago Board of Trade. Go there any weekday morning and you can see, from the visitors gallery, the buildup in excitement and anxiety as the various markets are about to open. I've watched many times as the younger traders are getting more and more keyed up. The mature brokers that make the opening market are getting orders coming from all over the country placed in their hands by attendants called runners. The brokers don't even look at the size of the individual orders. They can just "feel" the amount to be traded on the opening by the weight of the stack and the pre-opening activity around them.

The opening bell goes off and suddenly this broker is yelling and screaming along with a couple of hundred other traders. But, there is a difference. Our guy has only a few moments to clear all those orders and, with the other main brokers and large traders, has "made" the opening transactions worth hundreds of millions of dollars at a market clearing price. The observer and most new traders are

befuddled by it all, because it took place in a fraction of a minute amid total chaos.

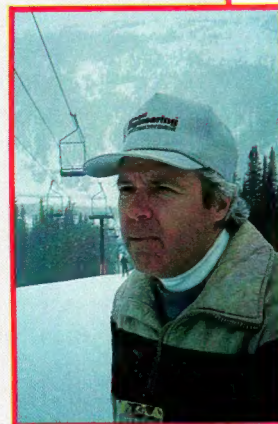
The second form of real confidence is found in the ability to handle the risk of the unknown on a regular basis. Not the rebellious and artificial confidence of youth, but a seasoned confidence that says "I've seen most of this before, but I find excitement and challenge in the unexpected." It's a sort of measured, individual, Captain Kirk sort of confidence. This is the confidence that the entrepreneur conjures up.

On Average

Look around you. Pretty much all you see, on average (and I mean that), are folks doing regular stuff that doesn't amount to much, even in their own eyes. They simply want to "make a living" and get a little ahead — which translates into keeping up with inflation and getting a little more recognition/reward just for being alive a little longer. Contrast that with an entrepreneur at any age or level of experience. The major difference is that the entrepreneur is stating flat-out that they are not only willing, but want to be judged (and will do so themselves) by the success of their ideas, innovations, and products.

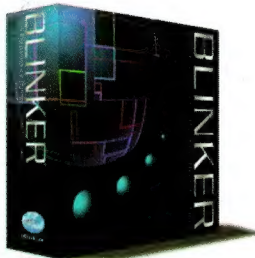
Why would they want the risk? Simply because, with the risk comes rewards in many forms — even if they fail, they are miles ahead of the person who did not try and light-years ahead of the person without ideas or a sense of the *possible*. Besides monetary rewards, there is the sense of satisfaction and the overall ability to self-direct their destiny. In the sense of destiny, there is not a single class of individuals or groups anywhere that really has this option and this level of control.

The compulsive confidence comes from the possibilities seen and understood and the emotional commitment to try! If you aren't seeing it, you are wasting one of your natural resources (time) and one of our country's natural resources (freedom). Your time will disappear, believe me. But, the freedom to try isn't ever going to go away until the concept of America dies. The possibilities are endless and require no government programs and no recycling nonsense, and certainly no affirmative action. Once you enter the world of the entrepreneur, you will never be the same.



Bill Gator

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Reader Service Number 33

Ralph Tobelmann

Minding my own business (which happens to be this magazine) sometime in 1993, I was entering subscriptions and I came across a name from the past. On one of those flimsy little cards that people pull out of card decks to get a sample issue — that is really a subscription obligation that they don't take seriously — is the name Ralph Tobelmann. I mean how many Ralph Tobelmanns can there be?

Ralph and I met at DATUM, a small company in Orange County, California, located just a few blocks from Disneyland. DATUM developed and marketed peripheral controller cards for a variety of mini-computers like the DEC PDP-11 and the (then new and much heralded, but destined to go nowhere) IBM Series-1 16-bit mini.

Ralph had been with the firm for

drivers and diagnostics for these new peripheral controllers, while Ralph was developing the hardware and firmware of the controller itself.

For the year that I was at DATUM (mid-1978 to mid-1979), Ralph and I became good friends, playing tennis after work and a couple ski trips that winter. Ralph had his Porsche and I had my Corvette. We were all living the classic Southern California upwardly mobile high-tech life. It all fits so neatly in the memory. I remember sunny days, flashy cars, exclusive residence, and a 40-minute uncongested backroad commute through the oak trees and winding roads of the Sierra foothills.

But, I went on to National Semiconductor in Santa Clara and the circuitous route to finally publishing this magazine. I did talk with Ralph a couple of times over the following few years. He stayed with DATUM for a few months, then went off and did some consulting. Last I heard, he was developing peripheral controller cards for the new IBM PC with a couple of guys in the early 1980s.

When my mind returned to 1993, I finished entering Ralph's subscription and noticed that the address was Steamboat Springs, Colorado. Well what do you know, Ralph must have hit it big with his PC plug-in cards and retired to ski his tail off. I know where he is, but he doesn't know what I am doing. I assume, of course, that he will read the magazine and figure out what I'm doing and maybe we can get together sometime...

Flash Forward

It's now 1995 and I'm still minding my own business (this magazine) and the phone rings.

"This is Ralph Tobelmann and I need to change the address on my subscription."

"Ralph, how are you doing old friend?"

by William E. Gates

"Bill, is that you? I had no idea that you were the same Bill Gates that I used to know 16 years ago. You do this magazine?"

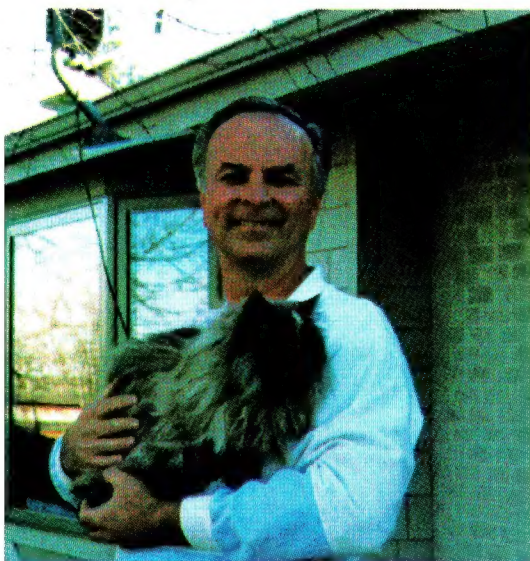
So, we talk about old times for about an hour, tying up my inbound line at his cost. To compensate, I offer to buy him lunch at the restaurant of his choice (he's a vegetarian) in Denver in a couple of days when I pick up the SCR power conversion unit being repaired for my printing press.

After 16 Years

Over lunch I find that Ralph is recently divorced, moved from Steamboat Springs ski resort area to Boulder, switched from mostly hardware to mostly software, and is working in some new and exciting areas. Completely entrepreneurial now, he has several products under way using GPS and just completed a crash project for displaying on-screen timing for a televised ski race.

It seems that while he was getting his PC plug-in card business going, he came across a situation that many of us wish for. Western Digital was just taking off with the PC disk drive controller business in the early 1980s and had a division that produced older products which were not profitable for them to manufacture and maintain. WDC wanted to get those products off of their high volume disk drive production lines, but wanted their customer base to continue to receive technical support and a little product enhancement would be okay.

Ralph and his buddies picked up the product line for a song and immediately began to make changes. They noticed that the technical support was overburdened due to design errors. As is typical of small operations, Ralph and company modify the products so they are easier to align and more bulletproof in the field.



several years and I was hired as part of their new development for the IBM Series-1. IBM was marketing the Series-1 as a front panel driven open architecture with minimum set of peripherals. Third parties were encouraged to come in and develop printer, disk, and mag-tape subsystems. My little group was designing

Entrepreneurial Profile

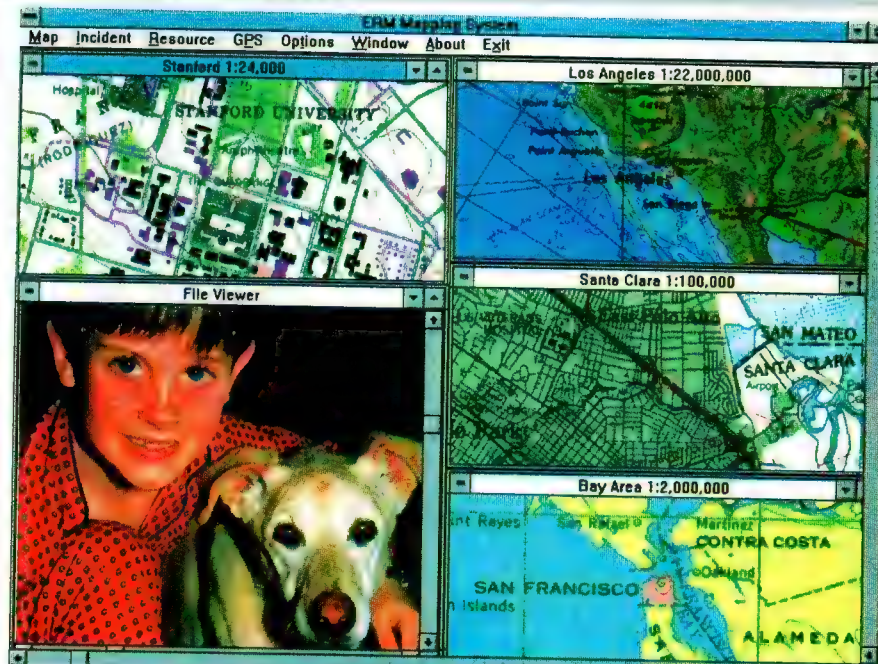
They retrofit existing customers who then order more and before they knew it they were profitable. And, the product line that was supposed to last only a couple of years had to taken out and shot after six years.

Along about 1991 Ralph realizes that the future is software, especially in remote areas like Steamboat Springs. He ties up with his brother-in-law to produce a real estate program designed as a user friendly GUI that agents could sit their clients in front of and together select the ideal house. The bonus came when property profile was completed, because they not only saw the typical MLS data but pictures of the houses inside and out.

A friend Jim Ellis, the brother of a former business partner (a real long story but the reason for being in Steamboat in the first place), wanted to improve on his ski racing timing system by having a computer record the skiers times...and compute handicaps...and send BIB numbers to the starter...and handicaps to ...and it never seemed to end. The project seemed doable using Microsoft Visual Basic even with all the "why can't we's." However, the friend is involved with the Indy 500 where the timing is handled by IBM and IBM decided they also wanted to be involved in ski racing. VB gets shelved and out comes OS/2 and C Set ++ (IBM's answer to Microsoft Visual C++). Ralph says he really likes OS/2 and its multithreading.

In January a new "relay" race format is decided on, to be run at Keystone resort in Colorado on the day before the Super Bowl. Then, CBS would air it two hours before the Super Bowl. With only 10 days left, a contract is signed and the mad dash begins to write a new program to handle the new format, which also includes fields to be displayed on the TV screen.

Live testing begins the day before the race and Ralph finds himself running out of time. He's doing final debugging of the timing information display from inside an unheated tent in freezing temperatures. They have wires strung all over the ski slopes



connecting his PC to a network of timers that are supposed to be displayed against data from a database of previous runs and potential race winners.

CBS is ready to broadcast and Ralph is still working out the last bugs. Over lunch he related — I hope he doesn't mind me telling you this, because we've all done it before — one of his last bugs. He had a C++ statement like "if(x = whatever){}" that he looked at a million times. It's just one of those gotchas. Having spent several weeks working with VB prior to the ski racing job and on 5 hours sleep had him reading right over what should have been "if(x == whatever){}" and you can imagine how dumb you feel when you finally find something like that. But he did, and just in time.

Although he didn't get to see the CBS broadcast the next day, with his timing display overlaying the skiing race background, everyone (including CBS) told him it looked great. In fact, CBS is wanting Jim and Ralph to keep the software hot, because it was such a success that they want to do six races next year which may include some international races.

Global Positioning System

So what is Ralph up to today? GPS is the new game. He is understandably coy about the new products, but I did get some insight. Now working with Guy Loughridge, from Steamboat Springs, he's essentially providing database mapping and dis-

play for a variety of public service organizations. He met Guy in a computer store in Steamboat Springs. Guy is a self-taught database programmer who had been doing a text-based Energy Resource Management program and needed Ralph's GUI abilities.

Public service organizations need the ability to collect mapping information and display it, correlated with various other resource information. For example, a pilot flies the perimeter of a forest fire and returns with the collected data which Ralph displays. He overlays known terrain and resources of the particular organization using the program.

While wanting to create mapping products for this specialized retail market, Ralph and Guy have been interrupted by a firm that wants all their time and talents to develop its own products that will be sold retail. The recurring nightmare for the entrepreneur: to risk it all by developing your own products, or sell your talent/technique for nearterm dollars and at least a short period of income security?

Ralph and I wrapped up lunch with a discussion of various approaches to getting royalties from contracted development while retaining a no-restriction right to the technology for use in his own Midnight Engineering.

Ralph may be contacted at 303-443-6040 or CIS:70473,533 or NETWZRD@ibm.net

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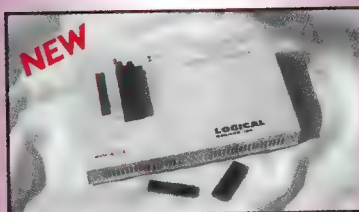


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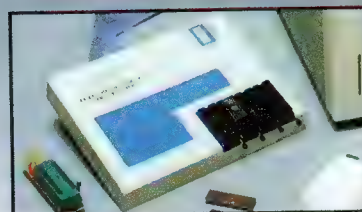
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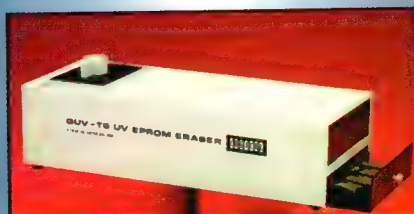
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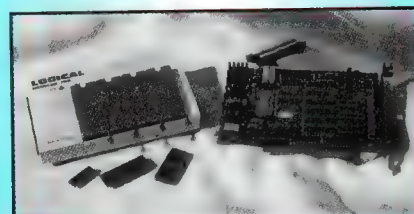
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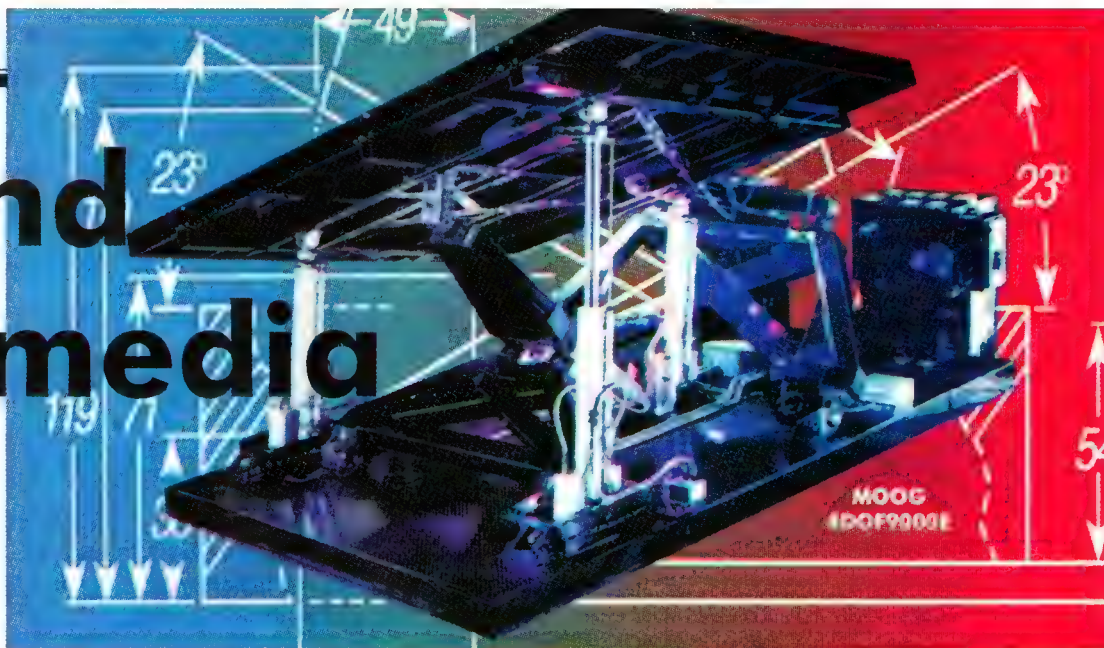
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Reader Service Number 3

Beyond Multimedia

Entrepreneurs will many times find themselves trying to figure out what big wave in money making products will be. Currently I am into CD-ROMs, but I've found myself asking "what's next?" I purposely try to look at the con-

sumer market when I conjur up these notions, because of the huge potential for volume of sales.



by Jim Stone

I've been thinking that the consumer is about ready for more sensations than the typical small multi-media speakers and 14" SVGA screens allow. You've even probably seen the rush by companies long in the home audio market to begin pushing mid and high end components for the multi-media speaker market. Sharp and other manufacturers have been steadily dropping prices on the video projectors that can truly hype up dad and the kids during a game of Doom.

I find inventing a new multi-media audio or video component not very fulfilling or appealing, and definitely too cost prohibitive. I believe we are on the verge of exciting and new hardware devices that will start appearing in the consumers' homes. Some of the new computer hardware that might start appearing in the consumers homes might be related to some of the systems and hardware many of us have worked with in government or hi-tech applications.

The consumer market is nearly ripe for an introduction to additional stimuli than audio and video affords. Even television ads are preparing for the consumer arrival of "the home system." I believe it was a Honda commercial that depicted a user of a home VR system experiencing a Virtual World while his wife was getting ready to go out for the evening.

Everyone seems to think they know what Virtual Reality is. If you don't believe that, the next time



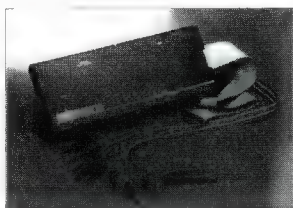
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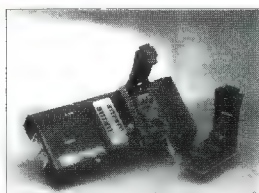
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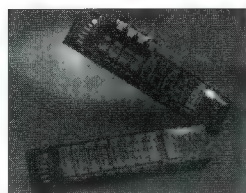
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you're around a non techno-phile simply ask "have you heard of Virtual Reality?" Chances are the typical consumer when asked about VR will say yes they know about it and possibly even describe what they perceive it to be.

Unfortunately the media has certainly done its job in bastardizing the use of VR, I cringe when someone starts describing a pinball game they read about as the latest VR innovation. Let's face it Virtual Reality is much like the brand name Kleenex — no one says "hey I need a facial tissue" do they? Likewise consumers don't say "I understand that there are over seven different states of self immersion and interactivity that can constitute a Virtual Reality experience." And yet, everyone knows that there is something called Virtual Reality and it is new, so it must be "cool."

Ivan Sutherland must be up for Sainthood or something. I don't think I could keep my head if I was Ivan knowing that I spawned Virtual Reality decades ago, yet now VR is considered new and some marketing braintrust states that VR can be experienced on a pinball machine! Oh well, don't get frustrated just invent something to feed on the consumers acceptance of hi-technology and corner a massive market share in the process!

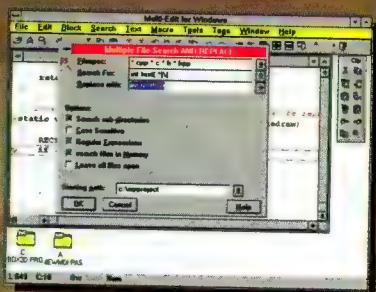
I personally am not a fan of consumer Head Mounted Displays yet. Partially because I've been spoiled with my exposure to the hi-buck military systems and the CGA looking images I've experienced in the under 2000 dollar systems. I realize that someday I will more than likely own one but until then I personally prefer traditional CRTs, (three channel displays especially — I know, I'm spoiled). Also consider that the government may start to regulate HMD's for medical reasons (I've let my knowledge on the latest AMA findings lapse, if someone knows please contact me). Can you imagine the red tape that will exist if the Feds do get involved? HMD development for the consumer is something I do not want any part of.

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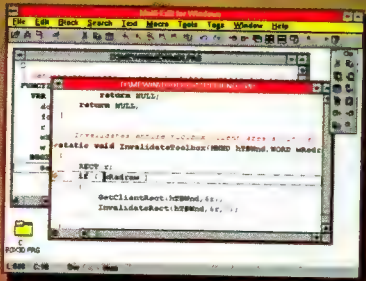
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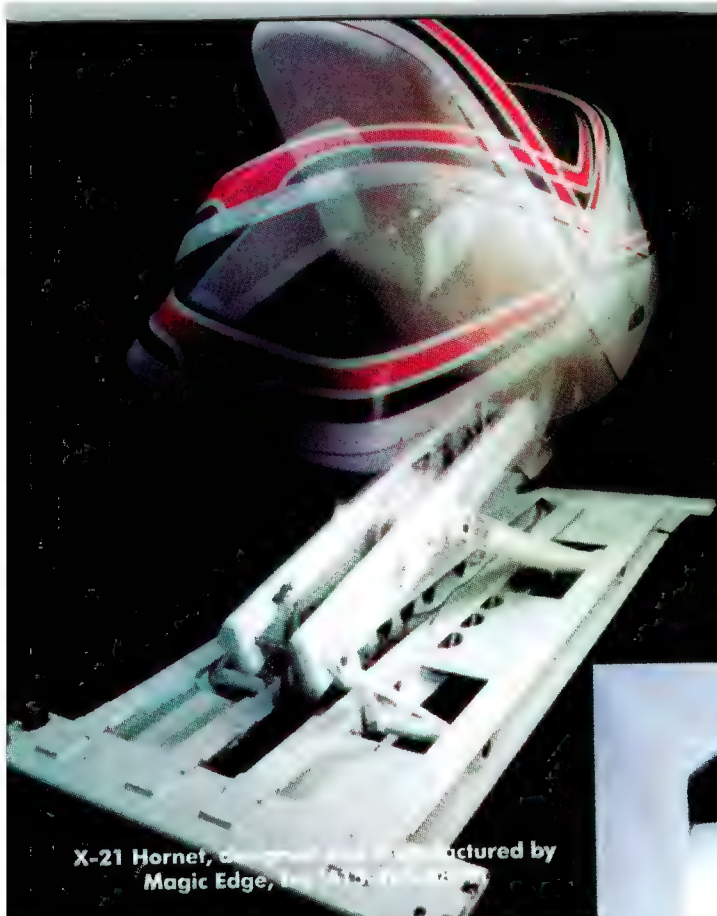
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X-21 Hornet, manufactured by Magic Edge, Inc.

What I believe the market place is on the verge of accepting and then later expecting in products, are hardware sensory input and output devices to interface with their loosely described "Virtual Worlds." These sensory input and output devices I believe could be partially based on control loading systems and motion bases that are currently being used in the simulation industries.

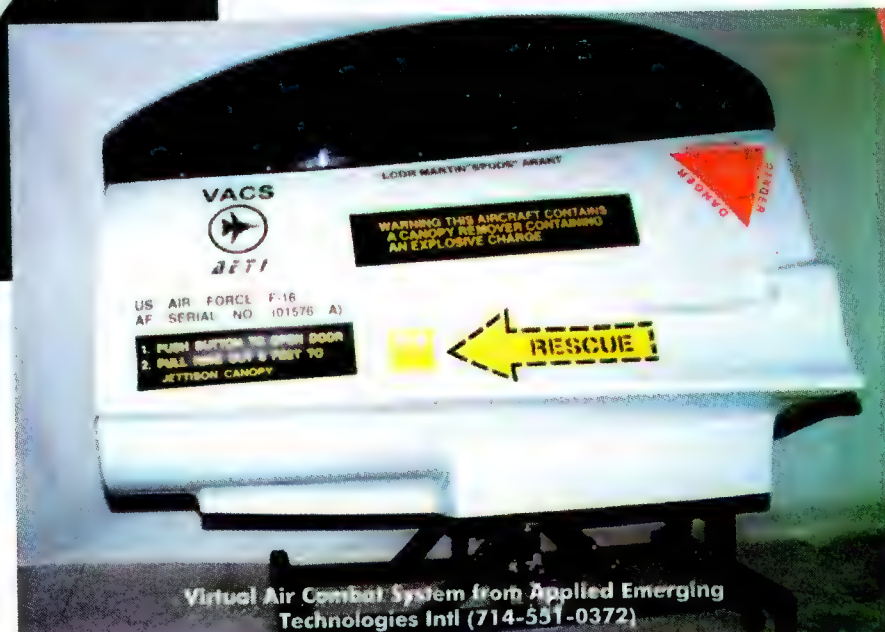
Imagine the marketing potential to general consumers when they grab a joystick, steering wheel, or foot operated device and force feedback is experienced? I can almost hear the schlock marketing phrases that will somehow paint a VR experience to be had in just using a darn joystick. Inexpensive control loaders and motion bases can be used to enhance any scenario from gaming to educational experiences and these devices could reside in many an average consumer household.

Mass production can certainly reduce the costs

What's Next?

of components that could be used to make consumer grade sensory devices. Three years ago I researched several magnetic linear actuators that were produced by Aura Systems of El Segundo, California. I found Aura's MLA's to be truly remark-

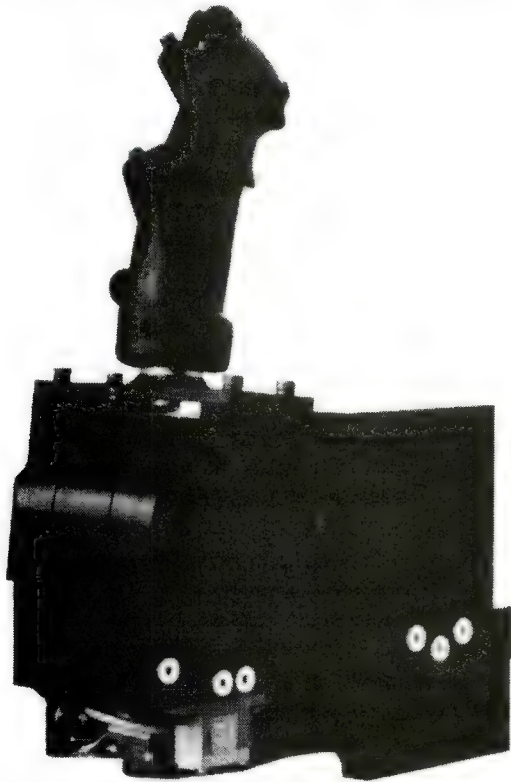
able in their performance and nearly unlimited in their potential. Yet, due to limited production runs, the prices were not workable. The project was scrapped due to a funds shortage, but I continued to follow Aura's progress. Eventually, Aura began marketing a consumer vest-like device named the "Interactor" that emits audio sensations to the wearers chest cavity to intensify interactive games. A product like the Interactor is going to be just too one-dimensional. On the other hand, control loaders and motion bases can be used in many



Virtual Air Combat System from Applied Emerging Technologies Intl (714-551-0372)



FLY-IT Simulator from Simpkins Design Group (619-434-1940)



dimensions (pardon the obvious but poor pun).

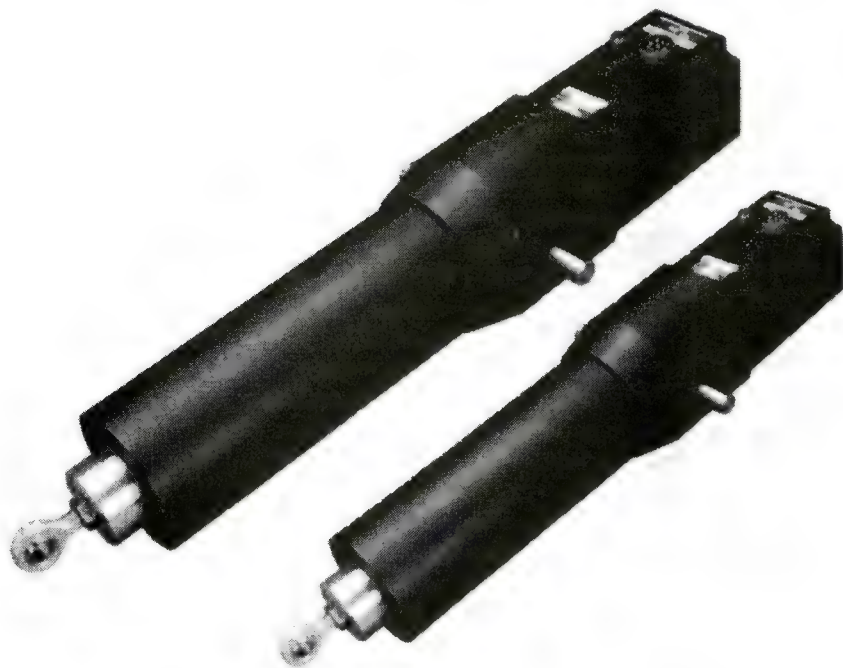
Motion bases, until recently, have required the use of hydraulics. Aura

at Aura I noticed in the trades that Moog unveiled a hydraulic-less motion base. Recently, I experienced Fokker's electronically actuated, six degree of freedom motion base that can "sling" over 5000 pounds without working up a sweat. I love those guys from Fokker — you can almost always get a beer at their booth and their products are so well engineered (but pricey).

Currently there are several flight-based systems that are available for the home today. I've discovered three products that use three different motion schemes: pneumatic, stepper motors, and user induced mechanical inputs that are

translated into motion.

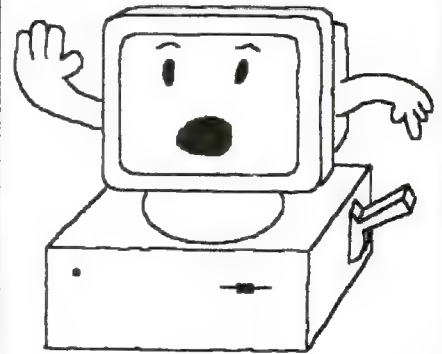
We all know the obvious application of flight scenarios for these products, but let's try to think of other



was the first company that I had heard of that produced components that could eliminate the use of hydraulics. About a year after looking

ancillary applications because tremendous revenue lies in broad demographic acceptance. Successful con-

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sumer products do require broad demographic acceptance.

Brad Engstrand, a fellow *Midnight Engineering* reader from Chicago, has started a company called ViRtogo, Inc. (Virtual Reality To Go) and has developed a 6 degrees of freedom motion base and several novel concepts (all patented) that I believe will soon find their way to consumers.

ViRtogo's motion platforms (single and dual place units) are pneu-

matic based, 6 DOF, and capable of throwing around up to 550 pounds. The specs on the two-person unit are plus or minus 26 degrees of pitch and roll, 22 inches of transverse circular movement (11" of left, right, forward, and back movement), 12 inches of heave, and plus or minus 25 degrees of yaw.

ViRtogo's products MSRP range from \$7500 for the single unit and \$9000 for the two-passenger. That is

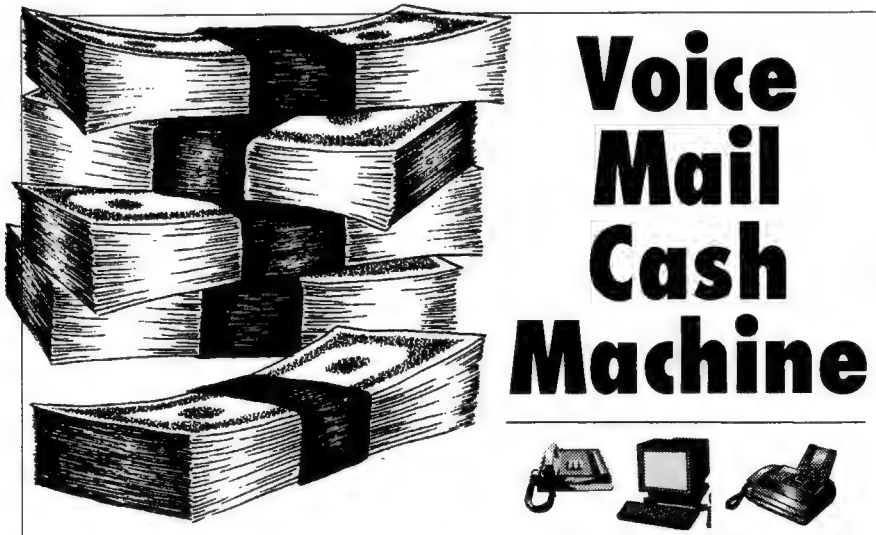
fairly impressive but what should be the cerebral turn-on for the entrepreneurial mind is contained in one of Brad's patents (more on the patent later). As you read this article, ViRtogo is shipping 4 two-person units to Goldstar in Korea.

As all of us know simulators can be active (typical flight scenario) and passive (typical theme park scenario). Obviously, active simulators are interactive and passive simulators require being programmed via an "editor" who watches the visual and encodes perceptions to the data base that are interpreted and played back on subsequent runs of the simulator.

The cerebral turn-on I referred to earlier is what ViRtogo has patented with their ability to encode motion cue information on the NTSC signal of standard broadcast television signal. Whoa! Can you imagine if this catches on how easily it will be to get the consumer market hot for devices that we have worked with for years? Brad claims he has even encoded motion onto Three Stooges tapes and those who have experienced his Three Stooges find six degrees of freedom very appealing.

Engstrand has been approached by a reputable broadcaster that is interested in using ViRtogo's technology to encode motion cues onto their television signals. Could Brad have invented the "Gerber" standard for the home motion base and control loading industry?

If watching television and getting added sensations in the process is possible, imagine what else can be dreamed up? How about equipping key players in sporting contests with RF transducers that emit quantitative values of impact or action? You sit at home and get sacked at 3rd. Possibly I might even get to feel what a slam dunk is really like? Certainly the RF transducers may be a bit Buck Rogers but there could be a position created such as "Color Actuator Editor" to go along with the games "Color Commentators". Imagine the fun those wacky guys from Monday Night Football would have with that one?



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COD's Welcome

Another hot product that incorporates not only a motion base but also an entire visual system is the Virtual Air Combat System by Applied Emerging Technologies International from Irvine, California. VACS product is modeled authentically after the F-16 fighter and is controlled by stepper motors and has currently 2 DOF. Mick Jagger "flew" one of these backstage at a recent Rolling Stones concert and raved about the product.

Simpkins Design Group out of Carlsbad, California has created an interesting training and entertainment device that requires no outside power forces, just motion induced by the user. The unit is nearly perfectly balanced and has 2.5 DOF with pitch and roll being plus or minus 13 degrees. The .5 DOF comes from the fact that the rudder pedals only reflect movement in the computer math model. A realistic user interface is included right down to the actual Nav-Com radios, which is an obvious benefit to a person who is interested in this product for flight training purposes.

A fine source for those of us who are interested in building home systems is *Micro WINGS* magazine out of Dallas, Texas. *Micro WINGS* has, for the past five issues, shown the steps of building a dual place home flight simulator. In the article I discovered a very versatile I/O board called the EPIC card that looks very promising in several applications.

I want to keep this article respectable, but there is an application of "home" simulation that unfortunately will drive the marketplace — adult entertainment. Adult entertainment was the driving factor in the sales of VCRs nearly 20 years ago and now is a major profit center for some CD-ROM companies.

Though I do not believe in making money from adult entertainment applications, I have to believe that someone will. It also seems that the first person who is publicly sued for copyright infringement of another human in a virtual world environment will be famous and consequently rich.

Imagine unscrupulous BBS operators that provide CyberSex liaisons with famous actors and actresses. What would be the charges filed, defense, and punishments if any? It would probably be more interesting watching that on Court TV than the OJ trial.

My point is simply that there will come a time when home sensory input and output devices will become a part of the consumers computer sys-

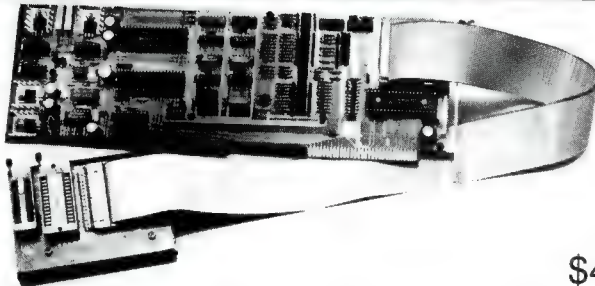
tem and a major revenue producer. Let's take what we have learned at the expense of the defense contractors and establish a cottage industry that certainly will produce a few leaders in this budding consumer oriented enterprise.



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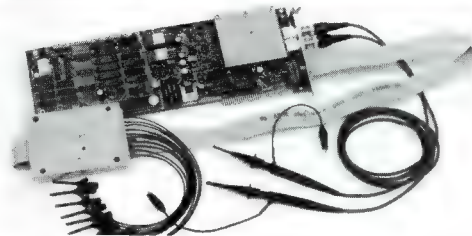
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ACCOUNT-ABILITY?

Please help! I feel like the Monty Python character who cries "I've fallen and I can't get up!" I'm drowning in a sea of part numbers, delivery dates, pro-forma invoices, partially received orders, Systronix part numbers which map to multiple vendor part numbers, prices and availability which changes weekly, and on and on . . .

Our DPB2 Universal Dallas Development System is a single-board computer product with about fifty component parts. We purchase the board components from six different vendors. Lead times vary from one to twelve weeks. When one vendor quotes twelve weeks, another may

by Bruce Boyes

have stock. What was stock six months ago can be 8-10 week lead time now, and vice-versa. Each vendor has different part numbers which all map to the same functionally equivalent part. Each vendor's part comes in different standard quantities, and may have different quantity price breaks.

We also sell some DPB2 components to customers, especially hard to find parts such as processors, LCDs, keypads, and SIMM sockets. Customers order one or more components in different quantities. For example, one customer uses no LCDs but does use keypads and SIMM

Table 1: TYPICAL ACCOUNTING SOFTWARE MODULES

Module	Name	Description	Typical Reports
A/P	Accounts Payable or Purchases	Manage orders you place with vendors for raw materials	Aged Payables (how much you owe vendors)
A/R	Accounts Receivable or Sales	Manages orders customers place with you for finished goods	Aged Receivables (how much customers owe you)
G/L	General Ledger, including your Chart of Accounts	Links other modules, includes ability to adjust entries from one account to another. Classifies and groups income, expenses, assets and liabilities	Balance sheet, Income Statement, Profit & Loss, Account List, account transactions, account balances
	Checkbook	Pay bills, Receive sales income, Deposit received funds	Print checks, checkbook register, reconcile checking amounts with monthly bank statements
	Inventory	Tracks raw materials and conversion to finished goods, value of inventory	Stock report, inventory count sheet, Bill of Materials, cost of goods, part order history, dead inventory
	Card File or Customers and Vendors	Names, addresses and other info of people you sell to or buy from	Mail list, import and export from other programs, current balances, sales or purchase history
	Payroll	Manages paychecks and payroll tax withholding, includes rate tables	Print paychecks, quarterly and monthly tax due, yearly tax reports
MRP	Manufacturing Resource Planning or Material Requirements Planning	Schedules builds of finished goods based on a bill of materials and pending vendor orders and customer purchases	Allocated parts quantities, scheduled builds and orders, parts shortages and requirements, inventory cash requirements
POS	Point of Sale	Manages cash registers in a retail sales business	Daily sales totals. Totals per employee. Inventory update.

sockets. Now imagine trying to maintain stock of all these items and schedule orders from suppliers.

Our order from our suppliers each month consists of the sum of customer orders plus what we use in production. We have to order some components 12 weeks in advance, others only two weeks. Now if some customers call and want to change their orders around, how do I easily integrate these changes into my purchase requirements and generate revised purchase orders? Such are the joys of hardware manufacturing!

My Experience

In the early days of Systronix, we used Ready-to-Run (Lotus templates & macros), Dac-Easy, and custom spreadsheets for payroll, parts inventory, and customer invoices. More recently we have tried Peachtree for DOS, Peachtree for Windows, and BestWare's MYOB. We evaluated a copy of EZ Inventory. We just received and installed the latest Intuit (now Microsoft)

QuickBooks release 3.0. My experience with these programs has varied from disappointing to exasperating.

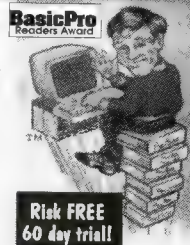
What's Wrong With This Picture?

Every day we use sophisticated compilers, word processors, desktop publishing systems, mechanical and electrical CAD software, spreadsheets and databases. We've been using the networked, Windows version of Goldmine (a contact manager) for over a year without a single General Protection Fault. I can customize these programs to my needs quickly and easily. We take the inclusion of macros and scripts for granted. Many programs now include "wizards" or "coaches" to help you customize your application and environment.

So why can't I get either Peachtree, QuickBooks or MYOB to print a vendor or customer FAX number on a purchase order or invoice? Why must I export the entire customer list or part list to a file in-

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Reader Service Number 134

Remote Voice Reporter Computer - Remote Terminal - Controller

Voice Features:

- ASCII Text to High Quality Male Voice
- Automatic Dialing and Answer
- Access from any Touch Tone Telephone
- Analog Values Reported in Engineering Units
- Report High/Low Alarms and Events
- Touch Tone Control with Password
- Unlimited Vocabulary by User
- No Custom Recording
- Application Software Included

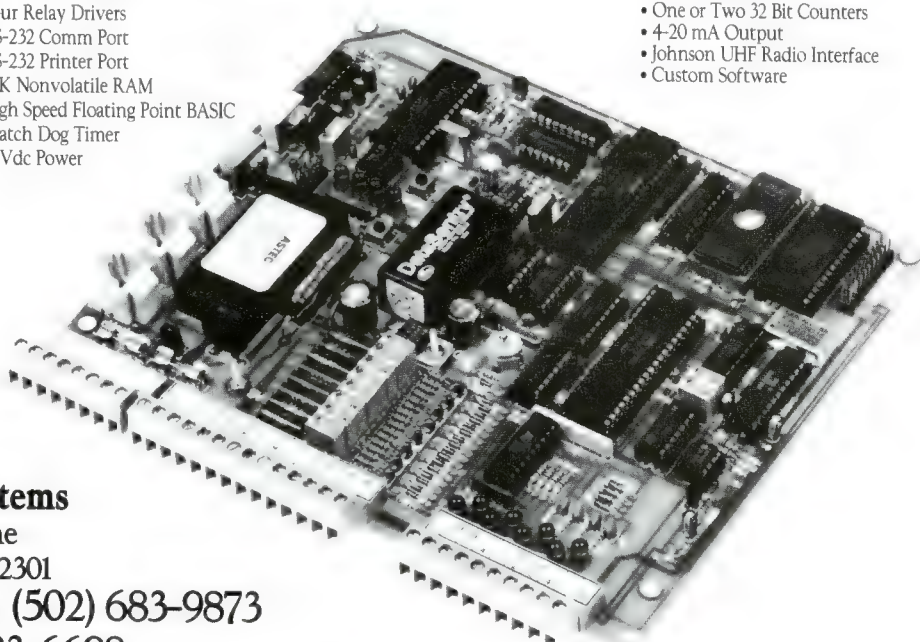
Interface Signals:

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- Four Discrete Inputs
- Four Relay Drivers
- RS-232 Comm Port
- RS-232 Printer Port
- 32K Nonvolatile RAM
- High Speed Floating Point BASIC
- Watch Dog Timer
- 12 Vdc Power

Options:

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- Clock/Calendar
- One or Two 32 Bit Counters
- 4-20 mA Output
- Johnson UHF Radio Interface
- Custom Software

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C CODE FOR THE PC

source code, of course

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	TE Editor Developer's Kit for Windows V 4.0 (full screen editor, undo command, word processing; TER for application build-in; no royalties)	\$300
	C/C++ Libraries by Code Farms (persistent C structures, ER models, dynamic arrays, database functions, Jolt Award winner; specify C or C++)	\$260
	Victor Image Processing Library V3.1 (brightness, contrast, merge images, TIFF/GIF/PCX; color reduction source \$395; Windows \$550)	\$250
	TurboTeX (Release 3.1; HP, PS, dot drivers; CM fonts; LaTeX; MetaFont)	\$250
Updated!	Crusher! V3.00 (platform-independent data compression; beats PK & LH; encryption, disk spanning, self-extracting archives)	\$220
	TE Editor Developer's Kit V3.5 (full screen editor, undo command, multiple windows; includes word processing)	\$280
	COMM-DRV Version 14 (complete interrupt-driven serial communication libraries & device drivers; full source)	\$155
	Minix Operating System (Version 1.5; Unix-like operating system, includes manual; specify 5.25" or 3.5" diskettes)	\$150
NEW!	Delorie GCC for MS-DOS (Version 2.2.2; includes C++, assembler, DOS extender, 387 emulation; complete source code and makefiles)	\$150
NEW!	JAKE 3.0 (embeddable natural language processing engine for queries in English to databases, games, help systems, etc.)	\$150
NEW!	Moby Crypto II (PGP, DES, Secure Hash, UFC, MDs, Crack 4.1, Lucifer, IDEA, VCR+, large integer packs, tutorials, more; not for export)	\$145
	OSF/Motif 1.2.4 (port of Metrolink OSF/Motif to Linux; single CPU license)	\$140
	Lisp for DOS (Kyoto Common Lisp and CLISP; KCL includes Lisp-to-C translator for building mixed Lisp/C programs, two big manuals)	\$135
Cheaper!	Ibrow (Version 4.1; programmer's Windows-based editor; large files, help, undo/redo, drag-n-drop, function & type tags)	\$125
	XASM (cross assemblers & utility programs; 65xx, 68xx, 80xx; Intel or Motorola hex format; macro preprocessor)	\$120
	ET NeuroKit V3.1 (back error propagation and Kohonen)	\$100
Updated!	SCM (portable Scheme in C, IEEE standard, includes JACAL symbolic math package; SCM-4D0/SLIB-1D5/JACAL-1A3)	\$100
	PC/IP (CMU/MIT TCP/IP for PCs; Crynwr drivers, NFS server, Bdale mailer, PCRoute/PCBridge, NDIS/ODI drivers, Beholder, more)	\$95
	DA (disassembler for Microsoft's New Executable (NE) binary files including Windows .exe, .drv, .dll, and .flt)	\$90
	Script Interpreter (a command script interpreter for DOS-based systems; C-like script language; lots of features)	\$80
	CELP 3.2c (Federal Standard 1016 Code Excited Linear Predictive voice sampling and encoding; voice over 4.8kbps; Unix code)	\$75
	PPCCOMM V3.0m (C++ serial communications class library for DOS, Windows, OS/2, and NT; includes X/Y/Zmodem)	\$60
	Kier DateLib (all kinds of date manipulation; translation, validation, formatting, & arithmetic)	\$60
	Coder's Prolog (Version 3.0; inference engine for use with C programs)	\$60
	PCCTS Version 1.10 (Purdue Compiler Construction Tool Set; like YACC and LEX together with lots of additional features)	\$50
	Container Lite V1.87 (C++ & FLC wrapper emulators; portable, persistent containers of arbitrary data including pointers)	\$50
	BigFloat (arbitrary precision floating point arithmetic and functions; includes BCD conversion)	\$50
	EZCalc (ASCII algebraic expression evaluator, unlimited parenthesis nesting, symbols, 32 built-in functions, easily extended)	\$50
	Backup & Restore Utility by Blake McBride (multiple volumes, file compression & encryption)	\$50
	CLIPS Version 6.0 (rule-based expert system generator; Windows compatible; manuals on disk)	\$50
	SuperGrep (exceptionally fast, revolutionary text searching algorithm; also searches sub-directories)	\$50
	OBJASM (convert .obj files to .asm files; output is MASM compatible)	\$50
	Editor Pack (20 public domain editors; micromacs 3.12, Stevie, Elvis, Moke, mg2a, DTE, Jove, Origami, CE & GRIEF)	\$40
	DES Encryption & Decryption (2500 bits/second on 4.77 MHz PC for on-the-fly encryption at 2400 baud; not for export)	\$35
	Database Pack (9 databases - simple to complex; DOS: isam, bplus, AVL, SDB, ID, gdbm; Unix: Requiem, Ingres89, Postgres)	\$35
	COP (poor man's C++; C macro package which implements C++ in C)	\$35
	RXC & EGREP Version 2.0 (Regular Expression Compiler and Pattern Matching; finite state machine from regular expression)	\$35
	Bison & BYACC (YACC workalike parser generators; documentation; includes C and C++ grammars)	\$30
	REGX Plus (Version 2.0, search and replace string manipulation routines based on regular expressions)	\$30
	Spell Pack (6 spelling programs, a hyphenator, 2 utility packs and a 60K word list: Ispell, Microsp, Sp, Cspella, Spell, Dawg, Soundex)	\$30
NEW!	GNU Awk & Diff for PC (both programs in one package)	\$30
	Garbage Collecting Pointers (smart C++ pointers; no need to delete; detect NULL and out-of-bounds pointers)	\$30
	Crunch Pack (30 file compression & expansion programs; now includes portable ZIP)	\$30
	OORT (C++ ray tracing code from the book by Nicholas Wilt)	\$25
	OEmacs (full GNU Emacs for DOS and Windows DOS box; C++ support, etags++, lots of .el files)	\$25
	CTask Version 2.22d (robust MS-DOS multitasking kernel; C functions run as light-weight processes; mailboxes, interrupts, pipes, etc.)	\$25
	PERL for MS-DOS (Version 4.019; C, sed, awk, and shell all rolled into one language; includes hardcopy docs)	\$25
	GNU RCS (FSF's version of the Revision Control System; like Unix's SCCS only better; keeps track of software development)	\$20
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	Moby Pronunciator II (175,000 words & phrases encoded with full IPA pronunciation & emphasis points)	\$265
	Moby Part-of-Speech II (230,000 words and phrases described by prioritized part(s)-of-speech)	\$200
	Moby Hyphenator II (185,000 words fully hyphenated/syllabified)	\$105
	Moby Words II (610,000 words & phrases with Scrabble(tm) word list, place names, baby names, acronyms, core list for spell checkers)	\$100
NEW!	Linux Bible (Everything you ever wanted to know about Linux, 700+ page book)	\$40
	CIA World Bank II Database (13MB of maps, 5.7M vectors; coastlines, rivers, political boundaries; 5.25" HD only)	\$35
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	The World Digitized (100,000 longitude/latitude of world country boundaries)	\$30
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NEW!	Prime Time Freeware for AI (5GB of AI software, expert shells, languages, theorem provers, etc.)	\$60
Updated!	Prime Time for Unix (Volume 3, No. 2, Fall, 1994; over 6GB of Unix C code)	\$60
	Walnut Creek Libris Britannia (over 600MB of the best of British boards; not all source included)	\$50
	Walnut Creek C User's Group (Volumes 100 to 364)	\$40
Updated!	Plug-and-Play Linux by Yggdrasil Computing Version 1.1.57 (run from the CD; TCP/IP & NFS; drivers; MPEG; SCSI support; lots more)	\$35
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	Project Gutenberg (literature, historical documents, reference books, census data, religious documents, math constants, etc.)	\$35
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Updated!	Walnut Creek X11R6 (X11R6 with contributed and comp.sources.x, complete C source)	\$35
NEW!	Walnut Creek GNU CD-ROM (entire GNU archive)	\$35
	Walnut Creek Usenet and Simtel Unix-C (600MB)	\$35
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	Austin Code Works Internet Warrior #1 (PC Internet tools: Gopher, Wais, Eudora, ph, Nupop, Trumpet, TCP/IP, FAQs, drivers, docs)	\$35
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NEW!	InfoMagic BSDisc (386/486 NetBSD and FreeBSD; ready to run; includes TCP/IP, NFS, X; many harddisks and video cards; no microchannel)	\$30
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stead of just the one customer or part I'm interested in? Why am I limited to 12-character part number fields when most of my components have at least 20-character part numbers? The product carton is plastered with magazine product awards. So why does it crash several times a day with General Protection Faults? Why can't I print a purchase order with both my internal part number and the vendor part number on it? Why can't I schedule an order for 50 pieces of a certain part per month and easily reschedule as needed?

Background

Accounting software typically consists of multiple modules, linked tightly or loosely, depending on the software vendor's philosophy. At a minimum, my business needs the modules described in Table 1. Low cost software combines several of these modules into a single integrated package. Payroll is usually the only option, and inventory and MRP are often unavailable.

Vendors generally sell higher-end personal computer accounting packages on a module basis. Each module

Table 2. MY ACCOUNTING SOFTWARE WISH LIST

Feature	Justification and Description
Network support, generic: (Novell, Windows for Workgroups, LANtastic, etc.)	Two or more people can accomplish useful work simultaneously. One can be recording customer orders while another orders parts from vendors. Or (even better) multiple people can be entering <i>customer orders</i> simultaneously!
Standard data format	Easy exchange of data with other databases, contact managers, or custom report writers. Most spreadsheets and databases will access xBase files.
Windows-based	Easy printing to Fax modems and laser printers. Easy exchange of data with other Windows programs. Easy for nontechnical employees to learn and use. Support multiple fonts and graphics images on reports and forms.
"Useful" Inventory	At least six character item numbers, 25+ character vendor part numbers and 256 character extended descriptions. Preferred and alternate vendors for each part. Standard package and price breaks for each vendor/part. Track lead times and costs of previous vendor orders. Support for multiple inventory sites for raw and finished goods so we can track stock at assembly subcontractors and distributors.
Bill of Materials	Create assemblies with multiple vendors for each BOM component. Easy to add, edit or delete components in a BOM. Generate a list of all assemblies that use a given part.
Simple Manufacturing	Schedule production of assemblies, generate stock requirements reports, combine all vendor parts into a single vendor purchase order. Track parts used in multiple assemblies, estimate required quantities for what-if build scenarios. Track parts in stock which are allocated for a scheduled build and shouldn't be sold. Four or five levels of subassemblies would be adequate.
Sales	Easy lookup of current stock while a customer is on the phone inquiring. Track open account, cash and credit card sales separately. Enter scheduled customer orders and integrate needed components and assemblies with MRP and purchasing. Ability to enter "pro forma" invoices which do not allocate stock until we book a sale. Multiple retail and wholesale price schedules for each saleable item.
Purchasing	Automatic ordering in multiples of standard package quantities. Automatic pooling of needed MRP parts into one vendor PO. Intelligent creation and maintenance of scheduled parts orders. Ability to receive a single PO as several partial shipments and track back orders or shortages.
Customer and Vendor Lists	Easy import/export from common database formats or contact managers, mail list programs, Fax managers and shipping programs (such as FedEx and UPS).
Reports	Ability to create custom invoices, purchase orders, change orders, pro-forma invoices, customs declarations, packing slips, etc. Customizable, automated "batch" printing of payables, receivables, inventory, etc.
Receivables	Track customer payment history, alert to habitual slow payers. Easily print statements and add finance charges to late accounts. Project estimated income based on scheduled orders and history.
Payables	Track our payment history. Project payables and needed cash flow based on scheduled purchases.
Fuzzy Searches	Ability to search inventory and customers/vendors for text fragments. For example, list all the "machine screws" we inventory. List all customer orders of a certain product, or list all vendors from whom we have ordered "HCT574" devices.

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- Add commands and macros.

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Reader Service Number 11

is useable by itself or linked to other modules. Optional modules could include payroll, point-of sale, custom report writers, links to mainframe software, bar-code readers, and more. In all cases I've seen, MRP is optional. Expect to pay \$600 to \$1300 per module, and another \$5000 to \$10,000 for MRP.

Mainframe or minicomputer accounting and MRP software is often \$20,000 to \$100,000 and requires an entire department to run and maintain it.

Bicycle or Lear Jet?

At times I feel like a pedestrian who wants to travel fifty or a hundred miles in relative speed and comfort. My transportation choice is a bicycle for \$50 or a Lear Jet for \$10,000,000. The bicycle requires little skill or practice to operate, and is inexpensive to operate. The Lear Jet requires extensive training and frequent maintenance, not to mention its high cost of operation.

So it is in the small business accounting software market. On the one hand you have a plethora of under-\$300 programs. These are easy to learn but seemingly written by people who don't use them to run a business. Customer support people ask questions such as "why do you want to change a bill of materials?" or "why doesn't your entire order arrive all at once with a single vendor invoice number?"

I often state this perspective to accounting software vendors. Then I ask if they know of any packages in the \$500 to \$1500 price range. So far we have found none. No one has explained why they fragment the market this way.

What Other Business Owners Do

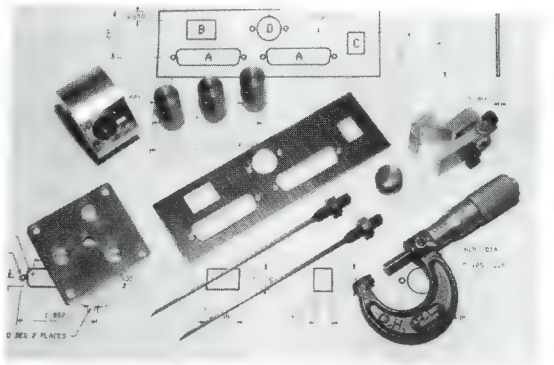
Over the last two years I've been asking other company owners what they use for accounting software. Many people wrote their own programs from scratch in C or BASIC, or using a database language. This is a major undertaking, and indeed, it took most of them at least a year to get a program working well. They acknowledge that this is an expensive, tedious solution, but felt that they could not find an off-the-shelf package which met their needs.

Others use off-the-shelf programs in the \$5000 to \$10,000 range and seem happy with them. Typically these same people devote 10-20% of their employees to accounting-related tasks. Companies with 25-30 employees often have at least one or two full time manufacturing expeditors, and one or two full time bookkeepers and accountants.

People using low-end accounting packages in smaller companies (1-5 employees) had many of the same complaints I did. Single person companies were the most likely to be happy with low-end accounting software.

One software vendor stated that 300,000 manufacturing facilities exist in the United States. Half of them have computerized accounting. Only 10% have any sort of MRP software.

Metal Work



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5V power required • Built in C-MOS LCD driver & controller • Easy "Microprocessor" interface • 98 ASCII character generator • Certain models are backlit, call for more info.

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640 x 480	Epson	\$50.00
640 x 400 (backlit)	Panasonic	\$35.00
640 x 200	Toshiba	\$19.00
480 x 128	Hitachi	\$15.00
256 x 128	Epson	\$25.00
240 x 128 (backlit)	Optrex	\$20.00
160 x 128	Optrex	\$15.00

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HeNe Laser Head (10mW max. output) TEM00, 15.5" long MFG: NEC \$99.00
Laser Power Supply (for HeNe tube) \$100.00

LASER SCANNER ASSEMBLY \$29.00
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LASER DIODE: Sharp part#: LT022MC
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LINEAR TYPE

2048 element CCD \$15.00 • 1728 element CCD \$15.00

HACKER CORNER

CELL SITE TRANSCEIVER \$99.00

These transceivers were designed for operation in an AMPS (Advanced Mobile Phone Service) cell site. The 20 MHz bandwidth of the transceiver allows it to operate on all 666 channels allocated. The transmit channels are 870.030-889.980 MHz with the receive channels 45 MHz below those frequencies. A digital synthesizer is utilized to generate the selected frequency. Each unit contains two independent receivers to demodulate voice and data with a Receive Signal Strength Indicator (RSSI) circuit to select the one with the best signal strength. The transmitter provides a 1.5 watt modulated signal to drive an external power amplifier. Channel selection is accomplished with a 10 bit binary input via a connector on the back panel. Other interface requirements for operation are 26 VDC (unregulated) and an 18.990 MHz reference frequency for the digital synthesizer. The units contain independent boards for receivers, exciter, synthesizer, tunable front end, and interface assembly which includes power supplies and voltage-controlled oscillator. Service manual, schematics and circuit descriptions are available.

Proxim — Spread Spectrum RF Modem \$99.00

The Proxim is a small communication device that replaces the use of a RS-232 cable hook-up with wireless (Radio Frequency) technology. Each module combines the functions of an RS-232 compatible modem (or any other RS 232 device) and a transmitter/receiver operating in the 902-928 MHz band. Module uses a spread spectrum radio which operates within FCC's guidelines and does not require a license. Indoor range of up to 500 feet possible using standard 1/4 wave antenna. Units support data rates up to 19.2 Kbaud (full duplex) and uses multiple channels to allow for non-interfering overlapping systems. Message format is 8 data bits, no parity, and 1 stop bit. Each unit requires 5 VDC supply at a maximum of 230 mA. A wide variety of configurations can be accommodated with parameters stored in non-volatile memory (EEPROM). Configuration changes are supported by menu driven, on-board software. Installation schematics and application details are available. Original cost on these units is around \$600.

Portable Micro Terminal

Flip up LCD display (9-16 VDC) • Can communicate with any computer having RS 232 port • Can communicate with another Microterminal • Use by itself as electronic notebook • Onboard microprocessor, data RAM (32K) and Video RAM (64K) • Complex built in diagnostics and set up capabilities. • Original intention for POS applications.
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Magazine Reviews

We always bought software recommended by other users and/or touted in computer magazine reviews. So how could we go wrong? I've decided that all the magazine reviewers do is play with the sample data files for (at most) a day or two. All the software we tried worked very well for a few days or weeks. Typically problems creep up when you cross month-end boundaries.

For example, Peachtree for Windows claims to have network support. Nevertheless, what you don't read in the brochures is that all users must be working in the same period! If you want to change periods, you must ask all users to log out. Then you must post or unpost (depending on whether you are moving to a future or previous month). You can imagine what a pain this gets to be after you use the system for a few months. In my experience Peachtree for Windows was not useful in a network environment.

Table 3. MY ACCOUNTING SOFTWARE OPTIONS		
Option Description	Pro	Con
QuickBooks with external MRP program	Quickbooks appears well written, so use its basic accounting features. Has good ASCII import/export ability. With purchase by Microsoft, we can expect network support soon?	No network support now, external MRP program is not well integrated to vendor purchases or other accounting functions.
Spend \$3000 to \$10,000 on high end PC package	Ready to use, some with xBase source code for customization	No MRP even at this price Can we do any better for the money? Some are not Windows yet
Find an acceptable \$1000-\$3000 program with MRP	If it exists I'll buy it at once and have an acceptable solution.	None, if it works.
Write our own in FoxPro, based on accounting framework for a head start	Easy to link to contact managers and other xBase program data. Customizable to our needs.	I barely have enough time for a life outside work as it is! Where will I find the time to learn FoxPro? Is this the most profitable use of my time?

Another Peachtree mind-blower: you can't change a bill of materials once you've used it! That's right, you can't add or delete a component or change a component number used in an assembly! In our case, we wanted to change a resistor from 390 ohms to 560 ohms. Peachtree support technicians seemed genuinely surprised that we would ever want to do such a thing.

We Ask the Experts

We've asked the Small Business Development Center for help. We have searched computer magazines and accounting software product directories. Two years ago, we were the subject of a project by a group of local business students. The students studied our needs and recommended Peachtree for DOS.

I hired a local consultant to work with my newly hired bookkeeper. Twelve months and several thousand

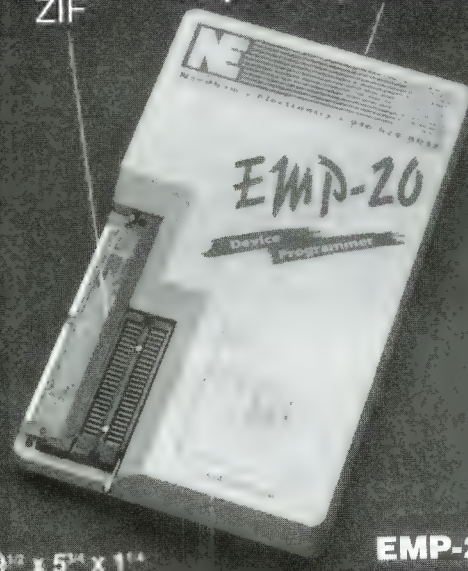
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Device Programmers

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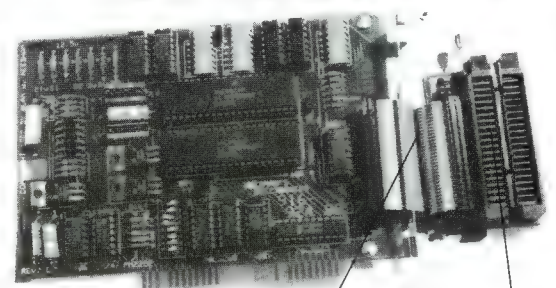
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dollars later, I fired the bookkeeper. Two CPAs advised me to scrap all of his work and start over. I read through all the manuals and in two weeks of serious effort, and consultant help, I was not able to master Peachtree for DOS to use it successfully.

I "upgraded" to the new Peachtree for Windows. Within three months it mysteriously began to mix up customer payments and invoices, as well as suffering from many other bugs and anomalies. After several weeks of interim upgrades and technical support, I gave up and asked for my money back.

We loaded everything onto MYOB. After a couple of months, it began to crash frequently with General Protection Faults. We are currently running the latest version of MYOB release 5, and after several technical support Faxes and phone calls these annoying crashes are still unresolved. Sometimes it takes three restarts of the program to complete a single customer invoice! Maddening would be a charitable description.

If you are wondering, we are not using any oddball or obsolete hardware or software. We properly configure our systems and periodically check for viruses. Our other application software works very well. For some reason, these low-end accounting packages are not robust.

We have experimented some with the new QuickBooks, although I have not used it for our actual accounting. It lacks a true bill of materials and assemblies in its new inventory. It has no network support, and Intuit representatives have no schedule for a network version.

I've asked several professional accountants what software they recommend. They all mention packages in the \$3000+ range. We've investigated some of these such as Cyma and ACC-PAC. Even simple MRP is a costly option. Neither Cyma nor ACC-PAC is available in a Windows version.

Table 2 has my small manufacturing business accounting software

wish list. I've only mentioned the non-obvious features here.

So What's a Midnight Engineer to Do?

I don't want to hire a crew of accounting people as Systronix grows. I believe it should be as possible to be efficient at accounting as it is at schematic capture, PC board layout, document generation, etc. Accounting software seems to lag behind the sophistication and ease of use of other common applications. Is there a better way?

Table 3 presents my options as I see them today.

A Call to Action?

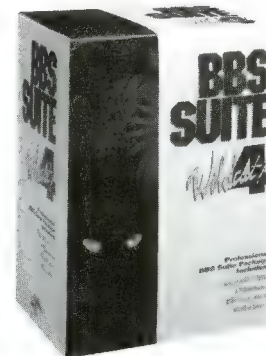
We just purchased an accounting "framework" written in FoxPro. This has many common accounting modules already written, with full source code. Perhaps this could be the basis for a collaborative effort of some sort among *Midnight Engineering* readers. I haven't had the time to evaluate it yet, so I won't give any further details at this time.

Is there a FoxPro whiz out there who would write an application, and then sell it and the FoxPro source? You could use the framework above as a starting point. A group of us could provide the specification and help test the product. Anyone who bought the finished product could modify it to meet their unique requirements. What if you had pending orders from readers? Bill has expressed interest in such a project, and I will commit to reviewing and evaluating it. That's one way to reach 30,000+ potential customers.

Interested? Please Fax or call me or see me at ENTCON '95.

ME
Bruce Boyes may be reached at Systronix, Inc. 555 South 300 East #21 Salt Lake City, UT 84111, 801-534-1017 or fax: 801-534-1019 or BBS: 801-487-2778. Systronix offers 8051-based embedded control hardware and real-time BASIC compilers. EDN Magazine declared the Systronix Universal Dallas Development System and Basic Compiler one of the Top 100 Hottest Products of 1994.

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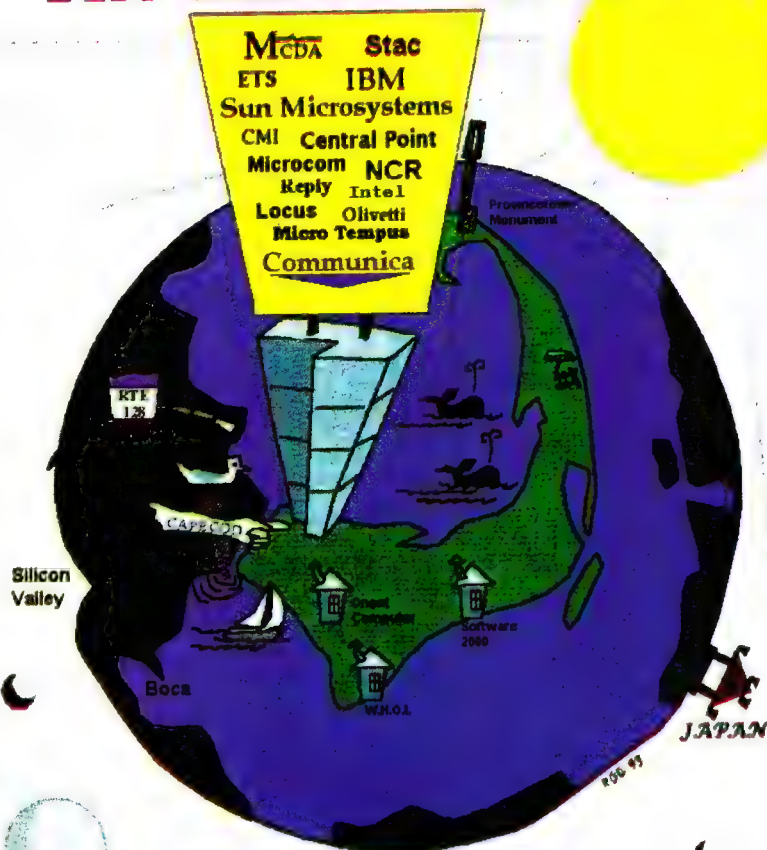
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Hard Dot — 2

During the process of building this issue of ME, I was struck by a few more possibilities in my quest for cheap color separations and image-setting. For the last year I haven't made much progress and had just about given up. But, I reexamined the process and realized there was still some room for improvement.

Basically, the color photos are scanned and then separated digitally by Ventura Publisher. Look closely at the pictures and you will see they are composed of dots of four colors (Cyan, Yellow, Magenta, and black). The size of the dots is relative to the number of Lines Per Inch (LPI) used in screening the separations for imaging a plate for each color.

The LPI figure is different from the number of Dots Per Inch (DPI) that the imaging device (usually a linotronic at 1270 DPI or higher) uses. The imaging device makes LPI dots out of DPI dots.

Given that I am producing positive separations with a Lasermaster 1200 DPI printer, the quality of LPI dot drops off rapidly as the LPI goes over 100. In addition, the higher LPI makes so fine a dot pattern that the camera can't capture all the dots — it starts to see gray. The camera needs to capture dots on film so that the resultant printing plates will deposit droplets of ink on the paper rather than trying to do the impossible task of placing shades of ink color on paper.

Since the Lasermaster is an 11" x 17" printer, I decided to blow up my imageset pages by 125% while at the same time reducing the LPI to 80. This makes an oversize printed page and all the integral photos are also oversize and quite coarse. But, when the camera shoots the page at 80% reduction, everything returns to about the right size.

The camera has captured bigger and better LPI dots because the Lasermaster was putting 1200 DPI into an image that was screened at 80 LPI. With the 80% reduction, the effective LPI increases to over 100.

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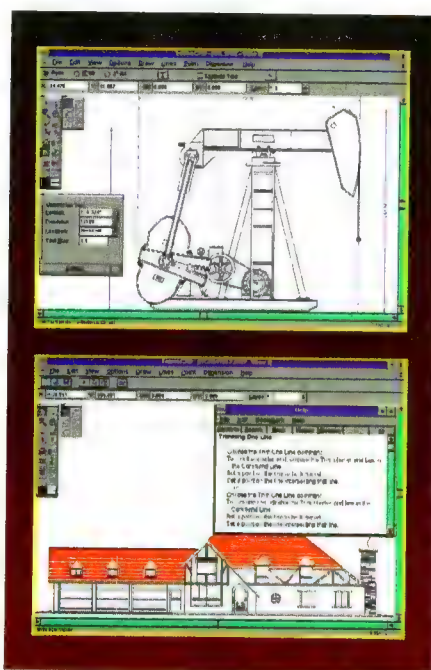
EconoCAD features state-of-the-art technology that can be instantly used by even the most novice of computer users. Yet it is powerful enough to draw and design practically anything you can imagine. And, EconoCAD is Windows compatible making it very user-friendly!

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Software Patents —

Software used to be everything except hardware, including computer programs, media and manuals. Now there is even "firmware," and the distinctions are blurring. Even limiting the definition of "software" to "computer programs" does not remove all of the ambiguity.

Often the choice of whether to implement a particular process or portion of a process in hardware, "firmware" or software, that is, in circuitry, whether hardwiring, non-programmable ICs, PLAs (programmed arrayed logic chips) or in some form of general programming such as ROMS or programming stored in other addressable memory is simply a design choice where the decision is based on factors such as cost, speed, flexibility, product life cycle, and so on. It is also a design choice which may change when revisited due to the different rates of evolution in the competing implementing technologies. To further blur the traditional distinctions, there are now technologies such as logic synthesis in which a software solution can be translated into hardware and vice versa.

The software-related patents being issued reflect this ambiguity. Many patents cover processes which can be implemented in hardware, firmware and/or software and include claims drafted to cover all such implementations.

The diversity and complexity of the nature and uses of software is remarkable. This diversity makes it difficult for policy makers, legislators or business people to arrive at any consensus about the optimal legal strategies for the protection of the intellectual property aspects of software at all, and much more difficult to generalize about the proper role of patent protection in the so-called "Software Industry."

The early 1994 PTO hearings on software-related patents provide significant insight into the diversity of persons and points of view within the software industry. While there were significant disagreements between various industry representatives regarding the value of patents and their impact on the industry, there was a consensus among those in favor of patents and opposed to patents, that the patent office has not done a good job in examining software-related patents. Some commentators were of the opinion that many patents had issued which would not have issued had the examiners had adequate prior art on hand. Other commentators believed that many meritorious patent applications were rejected for frivolous reasons. It is likely that both are right.

There has been significant disagreement among PTO examiners about the threshold issues of what categories of software-related inventions are patentable, with examiners gravitating to either anti- or pro-software patent camps. As a result patents would issue or not depending on the examiner to which the patent was assigned rather than the merit of the application. Lack of predictability about what could be patented and what could not, unreasonable delays in getting patents issued and that this has led to an unacceptable level of uncertainty regarding the scope and enforceability of software-related patent claims.

It is not fair to lay the blame for this situation solely on the Patent Office. The fact is that the Patent Office has received ambiguous instructions from the courts regarding what is and is not patentable in this area. Furthermore, because much software has been protected as trade secrets the Patent Office has not had access to the prior art needed to perform adequate examinations. Finally, the patent office had few, if

by Richard Evans

any, patent examiners with any education in computer science. As a result, the scope and enforceability of software patents is in doubt. Both the pro- and anti-patent factions of the software industry agree on one thing: this uncertainty is the worst possible world.

The Uncertainty Issues

Uncertainty makes business decisions difficult. It makes what should be routine decisions risky. As a result, it scares off investors and customers. Whether you are a holder of patents, are attempting to obtain them or are concerned about patents which are or may be issued to others, this uncertainty can have a major effect on your business. The sources of this uncertainty are the following:

*Uncertainty about what is patentable. Inventors of software-related inventions have experienced an unusual level of hostility toward their inventions by a subset of patent examiners who are anti-software. This division within the Patent Office has created inconsistent rules of examination and results. Thus, it is often difficult for owners of software-related inventions to predict with reasonable certainty whether their inventions are patentable. This uncertainty increases the difficulty of raising funds to exploit promising new software-related technology.

*Uncertainty about what is being patented. Many software-related patents remain in the patent office for fairly long periods of time. During the pendency of the application it is confidential. Thus, established technology which was thought to be freely available might turn out to be the subject of patent protection by the issuance or "surfacing" of a long-delayed "submarine" patent. The holders of such submarine patents may be able to extract unconscion-

Patents in Flux

able royalty payments, because the industry as a whole adopted a technical standard which later turned out to be proprietary.

*Uncertainty about the quality/enforceability of software-related patents being issued. While a number of software-related patents have now been tested by the courts, the uncertainty as to patentability and the perception that the Patent Office lacks the necessary expertise and knowledge of the prior art to do an adequate job of examination of software-related patents discounts the value of the best patents and allows holders of poor quality patents to extract undeserved royalties from users of the patented technology unwilling to risk infringement litigation.

*Uncertainty about whether your own product is infringing a patent. Because of the uncertainty about how to claim software inventions, the complexity of modern software programs, the difficulty in obtaining the needed prior art and the difficulty in searching for related patents, it is difficult even for those with the resources to hire patent attorneys and perform patent searches to get any strong opinion regarding whether there might be some patent out there which their product infringes.

*Uncertainty about what to do about all of the above. Finally, those in the software industry do not know what actions to take to protect themselves in such an uncertain legal environment. As a result of these uncertainties some in the software industry profess hostility toward software-related patents and are demanding that software-related inventions not be patentable. Even those with a generally favorable attitude towards patents and their potential benefit to the software industry are expressing lack of confidence in the PTO and in the legitimacy of the software patents it has issued.

Virtually all software-related companies have experienced problems with strategic planning and with investors as a result of the uncertainty. The uncertainty makes it difficult to get reasonably firm answers to vitally important questions facing any software technology company.

For example: Does your core technology infringe existing patents or patents which will issue someday? Is your core technology patentable and will the patents be valid and enforceable?

Unfortunately, it is much easier to ask the questions than it is to answer them. Recent changes implemented at the Patent Office relating to examination of software patents and encouraging the professional development of examiners will increase the quality of patents and the predictability of patentability decisions by the Patent Office.







Richard Evans is a registered patent attorney and a partner at Moore & Van Allen, PLLC, practicing in MVA's intellectual property practice group in Durham, NC and is a frequent speaker on various intellectual property issues at legal seminars. Mr. Evans can be reached at 919-286-8000 or at POB 3843, Durham, NC 27702.

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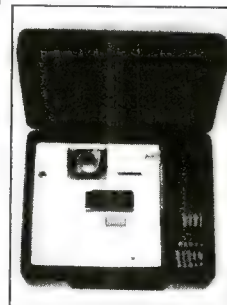
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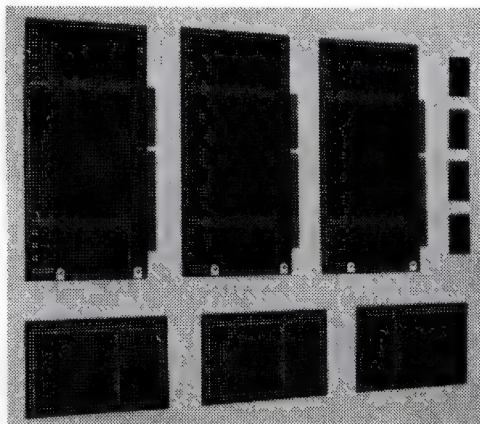
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Our Man In Rio

I was also travelling with the latest version of the 3DTV stereoscopic video display and decoding system, which just happened to become available because its creator, Michael Starks, had just returned from China a few days before I left.

The other half of the Brazilian presentation was to be a series of talks on virtual reality as an art medium and I had an entire collection of prints and digitally applied paint on canvas examples of my artwork (see photos) which still had to be packaged and prepared for the ultimate survival test that "fine art" objects could possibly be subjected to. There was even a last microsecond version of video production work that engineer and production expert Sherman Kennedy at Hvdra Grafx managed to complete.

With everything finally pulled together, I took off for the airport only to find that there was a big football game scheduled at the same time. Cryogenic molasses probably travels faster than the traffic on the freeway that day. The plane was just leaving the ground as I pulled up to the airport. I called Maria Byington, the event organizer in Brazil, to explain the situation and was on the plane the next day for the 12 hour flight.

I landed in Rio with 2 suitcases bulging with heads up displays and other VR hardware gadgetry, mysterious "black boxes," lots of diskettes, reams of paper, and a little bit of clothing. Plus I had the sealed boxes filled with all

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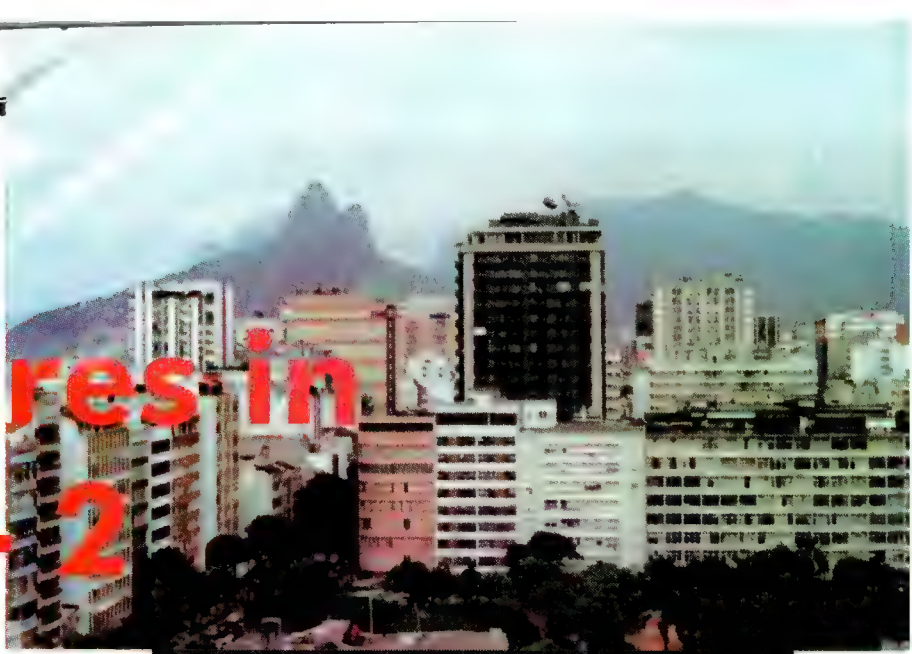
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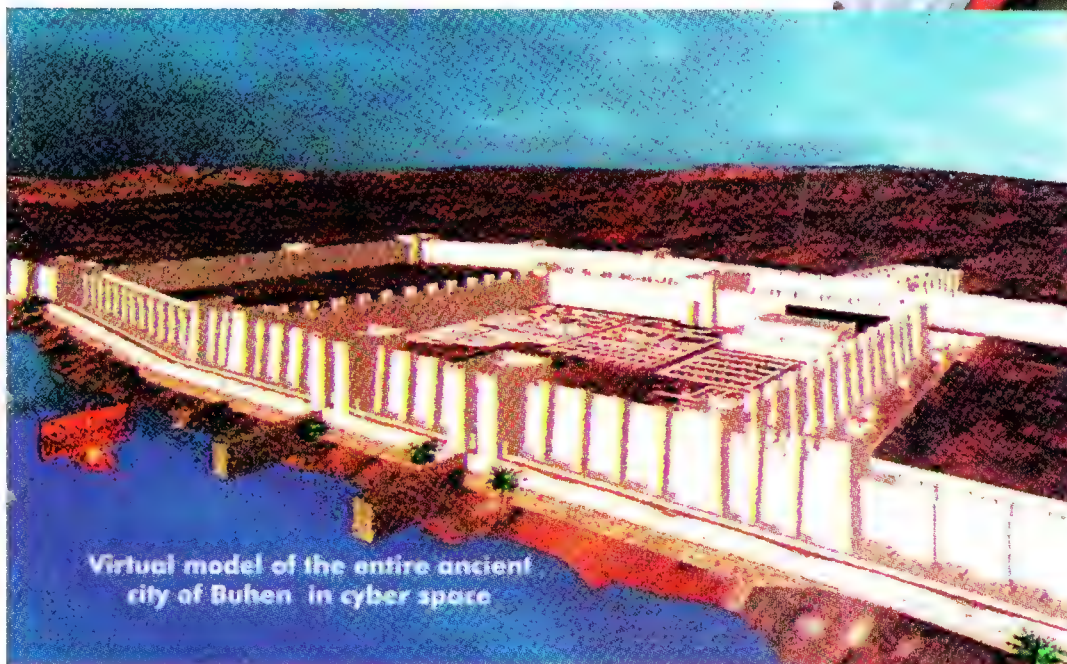
Virtual Adventures in Brazil — 2



by Charles Ostman

Brazil was host to a series of Virtual Reality lectures and presentations in Rio de Janeiro and Port Allegre in December 1994. I had been invited to speak, demonstrate the leading edge VR technology, and display my raytraced artwork. Part one of this adventure was included in the Jan/Feb '95 issue of ME.

I was traveling to Brazil with the latest "pre-beta" version of VREAM, the virtual reality software development tool kit that I have worked with and written about in previous issues of ME (Nov/Dec '93). This was a major upgrade to the software, and represented a substantial improvement not only for VREAM itself, but in the general realm of developing VR "worlds" and applications for the 486/Pentium platform. VREAM has many interesting characteristics, not the least of which is its GUI development interface for constructing worlds and their components. It utilizes an ascii script interpreter for loading worlds into the runtime shell (as opposed to having to compile C code for each new world construction), and the scripting language itself possesses many very useful logi-



cal operands and linkable features that can be used to assign "intelligence" to the world's contents.

This latest upgrade was the first release of their 32-bit version, and was, well, still experimental. In the last few days before travelling, I was busily trying to construct and modify various sample worlds which were to be part of the presentation. This was not only precarious, to say the least, but I was to arrive there with no computer, going on the faith that the machine(s) I was supplied with there would actually function correctly, and support my software installation and world operations. Talk about an act of faith!

of my computer artwork. The folks at customs were definitely going to have an interesting time with this one.

While in the labyrinth of customs, I encountered one of the other presenters of the upcoming event. This turned out to be Bill Riseman, an amazing individual who had been developing virtual reality models of ancient cities and archaeological sites. He had a complete Evans & Sutherland supercomputer, a Sun Sparc station, several other PCs and related equipment, and even a Leap boom mounted 3D viewing system. This was literally enough "stuff" to require a forklift.

Bill was truly one of the most gifted, and yet genuinely sincere intellects I had ever encountered in my many travels and experiences. Sadly, Bill suffered at tragic accident the day after we had completed our first set of presentations together in Rio. He was swept off a rock and into the sea at a coastal resort area. I will explain a bit more about this later, but in retrospective this certainly had an impact on me. I still ponder the various aspects of what happened, and hope to find some meaning in it.

But back to the "adventure" at hand. After what seemed like an epochal length of time, during which Bill and I had quite an interesting and wide ranging conversation, one of the organizers appeared at the customs office, talked with the customs officials, and suddenly both of us, and a virtual mountain of computer equipment were whisked out of the airport and crammed into a waiting VW bus.

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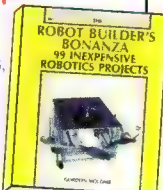
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Our Man In Rio

And there she was, Maria Byington herself (I had met her some months ago at the SigGraph show in Orlando, Florida). She was talking on her cell phone, (cell phones are a big deal in Brazil). After a hair raising ride through the streets of Rio, we arrived at the Cultural Center.

No time to relax, we were led straight into the main entrance of the VR show, which was already in full swing. Within moments we were on the stage, setting up equipment, plugging things in, and in general just trying to figure out what the heck was going on.

Now, I must say at this point that chaos seemed to be the normal mode of operation. But, everyone there was very gracious, friendly, and upbeat. Maybe a bit excitable from time to time, but one just has to adapt to the way of things in Brazil. Having a tolerance for chaos, and the unpredictable, and an ability and willingness to adapt to whatever circumstance might arise at any given moment, are absolute requirements for anyone that wants to flourish in this type of environment.

This was the opening night presentation. Never mind the fact that the power was sporadic at best, that the computer I was supposed to install my software on was temporarily "lost," and no one seemed to know exactly what was going to happen. It actually turned out very positive.

One of the more interesting "entertainers" that evening was the "video creature" (see photo), a very pleasant and creative local video artist who wore a "suit" consisting of video monitors, which would play taped "performances" that were as much theatrical events as a media presentation. There were a number of local Brazilian hacker types who were demonstrating some of their visual and experiential software.

Most impressive though was the number of people who were interested in the subject and showed up

for this opening night. The place was packed, and no one seemed to notice that a few of the demonstrations weren't exactly working. Everyone was just glad to be there and experience the "happening" event.

I had a chance to meet most of the participants of the event, including



the sponsor, Candido Mendes. Indeed, it was his building, the Mendes Cultural Center, a high rise technical building in the middle of downtown Rio, where the event was being held. Somewhere around 3:00am I actually got to check into the hotel. A room, with a bed, shower, and actual, genuine rest . . . what a concept!

Of course, this was only a momentary, delusional respite. Early the following morning, it was back to the Cultural Center and time for the serious work. Over the course of the



following week, we proceeded to give a series of lectures and topically specific presentations. My topics included utilization of the PC platform as a virtual reality system and also examples of virtual reality as a potential art medium.

Despite some of the technical difficulties, not the least of which was

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addressing an audience of 100 to 150 people in English. The audience listened in on headphones to Portuguese translation. They were very enthusiastic and I believe genuinely appreciative of the range of topics and discussions being presented.

There were those moments of sporadic adventure, such as when power in the entire building went down for over an hour during a particularly robust lightning and rain-storm (it rained almost the entire time I was there). Imagine absolute pitch darkness with an absolutely packed auditorium. And of course, there was the usual collection of disasters, like the data glove I had brought failing after the second day and a myriad of similar mishaps.

But I was amazed by what actually did work. Bill Riseman did indeed get his supercomputer system up and running. He had an incredible virtual model of the entire ancient city of Buhen in cyber space (see photo on page 33). Virtual Buhen is a complete, interactive virtual reality 3D model of the ancient city, an archaeological site in the ancient empire of Nubia (2500 BC) located in what is now the Sudan of Northern Africa. This is an example of the type of work that the late Bill Riseman was noted for.

There was also a virtual "snowboard" demo running on an SGI system, a very high resolution VR "city" that one could drive around in, an excellent demonstration of virtual automobile design and development video presented by Bruno Simon of Renault car company. It would be difficult to gauge the most noteworthy or interesting pres-

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entation since the caliber of expertise and diversity of VR applications was so great.

For me, the presentation offered by Daniel Sandin, developer of the now famous CAVE total immersion system, had the most impact. For those that are not aware, the CAVE system is an actual walk-in "room," in which all of the inner surfaces have a complete 3D projection environment cast upon them. From the "viewer's" perspective, it feels like really being "inside" the world being presented. It is probably the closest thing to a true virtual experience that a person can have with today's technology.

Daniel did not bring an entire CAVE system — that would have been drastically too much of an undertaking — but he did present a video of a cave "event." It depicted the experience of an artist who had suffered through a serious auto crash, and then eventually emerged back into a semi-conscious state. In her mind was the mental equivalent of a walkthrough of a virtual art gallery, and finally, she recovers and comes "back to life."

The aesthetic, and emotional content of this presentation was one of the most spectacular and heart-wrenching demonstrations of anything I had ever seen done in the realms of virtual reality. It was, in fact, the VR depiction of a true story. In talking with Daniel and his wife later, I really gained, for the first time, an understanding of the true potential that this technology may offer as a medium of experiential expression.

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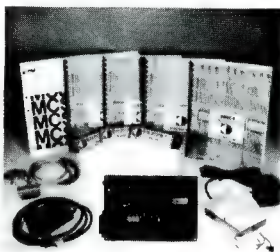
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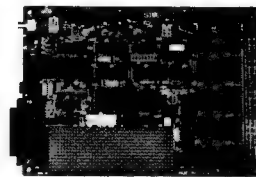
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Fourth annual ENTrepreneurs CONference

ENTCON 1995 is sponsored by *Midnight Engineering Magazine*. It will be held April 7-9, 1995 at the Denver Marriott West Hotel in Golden, Colorado (10 miles West of downtown Denver on I-70). The conference has been called a realtime version of *Midnight Engineering Magazine* and many of the speakers are regular writers for the magazine. Besides the Entrepreneurial Engineering topics ranging from product development to direct marketing, perhaps the most compelling reason to attend is your interaction with fellow Entrepreneurial Engineers. Preregistrations for this year include two attendees from South Africa, one from Australia, and another from the Philippines.

ENTCON '95 offers you a unique weekend of information and interaction that will educate and encourage you in your entrepreneurial endeavors. If you would like to participate in the mini tradeshow on Friday April 7, please call for more information. Free tables are set up from noon to 4pm and refreshments provided to start the conference on a unique and informal basis where some of our products are shown and demonstrated.

The speaker list always grows right up to the last minute, but here is the latest list:

Bruce Eckel — Behind The Scenes: Technical Authoring and Worldwide Technical Lecturing
Matt Trask — Managing Growth in a Directly Controlled Enterprise
Patty Taylor — Direct Marketing Products with examples of what did and didn't work
Bruce Boyes — Building a World Wide Web Page for your products on Internet
Todd Johnson — Moving a Major Product from DOS to WINDOWS
Steve Birrell — Fuzzy Logic: application examples
John Gaudio — Experts: The Consultant's rationale
Jack Krupansky — Derivatives of Your Product: More income from the same technology
Jack Eckles — \$1,000,000 in sales per year
Zack Urlocker — Developing and Marketing Better Products and Borland Delphi presentation
Bill Gates — Maximum Personal Productivity
Alex Lane — Personal Communication Security on Internet
Rick Martin — Watching Out For Inventor's Organization Scams
Anthony Claiborne — Intellectual Property Rights Update
Charles Ostman — Nanotechnology Update

Conference fee is \$159 payable by check to Midnight Engineering. For two or more registrations at the same time, use the corporate rate of \$129 for each participant. Due to costs and commitments, registration fees are not refundable. By the time you read this, there won't be much time left, so call immediately if you would like to attend.

The conference actually kicks off at 7pm Friday night and runs virtually non-stop until noon Sunday. A continental breakfast is provided Sat and Sun mornings and a buffet lunch Sat noon.

ME SKI '95 — Those who like to ski may want to join our group of about 20 whose abilities range from beginner to expert. Separate from the conference, we meet on Wednesday evening, April 5th, at the hotel lounge by the fireplace to discuss our skiing operations. We will ski Breckenridge on Thursday April 6, Keystone on Sunday NIGHT April 9, and Arapahoe Basin on Monday April 10. We carpool to the resorts and break into smaller groups based on skiing ability. You are welcome to join us for some excellent Spring Skiing. ME sponsors a brunch on Friday morning April 7 for the skiers and early conference arrivals from 10am - 11am.

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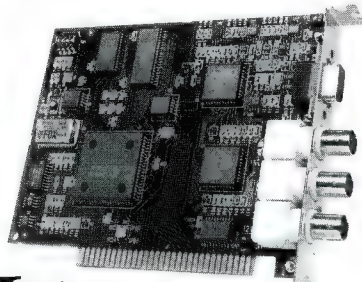
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Bill Riseman's presentation was incredible. His ultimate plan was to organize cooperation amongst the major museums and academic facilities around the world and provide the equivalent of virtual archaeological sites preserved forever in cyber space. The basic concept here is that many such sites, throughout the world, are rapidly decaying, due to pollution, human traffic, and overexposure. In some cases, these sites are unavailable to the world because of political problems in the area.

His goal was to create virtual world renderings of these sites, and then have these virtual worlds available as a 3D database that could be distributed and "experienced" at various institutions via local VR kiosk sites. For me, this was one of the most beneficial concepts for a VR application I had ever seen attempted. I had the experience of being one of the last people on earth to actually "walk around" in one of his ancient virtual cities. I can only ponder whether or not the audience members there in Rio who got to take their momentary walk through "ancient" cyber space, will ever truly appreciate the full implication of that experience.

On a lighter note, though, there was the usual collection of adventures and misadventures there in Rio. Even though it rained almost constantly, there was still a magnificent old part of the city to observe, excellent music in some of the local clubs, and as diverse a collection of people as one might imagine.

I also had my art show presentation to display as well. I had the extreme good fortune to be in the capable hands of Iracema Almeida, who is not only a very capable artist in her own right, but also was immensely helpful in getting my canvases (see photo) unrolled, put on frames, and set up in the gallery. The art presentation was very well received, far beyond my expectations.

Despite a variety of difficulties, the people were great. There is a common saying in Brazil, which in rough translation is the equivalent of "we will find a way." This maxim was

often tested, but always met with eventual positive results.

Sometimes the circumstances were just plain humorous. The relative uncertainty of whether anything might work at any given moment was always a source of excitement. I visited one of the local colleges to give a workshop lecture on how to set up and run VREAM worlds on the PC. The microphone never worked at all, the amplifier for the PA system made an incredibly horrible screeching sound, and I had to give most of the lecture by shouting into the audience in English with no translation assistance, hoping that something made sense once in awhile. Actually, when I started drawing logic diagrams and related renderings on the blackboard in the lecture hall, folks were very attentive, and indeed, absorbed the material quite readily.

The schedule was intense. There was very little time that was not spent either in the show itself, or talking with various groups, attending various pre-arranged parties, social events, and the like. For reasons that I can only speculate upon, the local press seemed to single me out for a lot of attention. The fact that I have written for (and am now a technical editor of) *Mondo 2000 Magazine* may have had something to do with this. I was astonished at how many people I met there who were aware of the magazine *Mondo 2000*, and in fact were devoted followers of the publication. Mondo is, well, unique, to say the least. It is the original cyber culture magazine.

There were local TV interviews. I was eventually on the major national TV network TV Globo, and also on the front page of the major national paper, O Globo. All sorts of people seemed to want to get my attention. It was a bit bizarre at times, but as I have previously noted, adaptability to circumstance is always the mode to follow.

There were those moments of doubt that I experienced, considering the world class level of expertise that was represented by the other members of the group. After all, I was merely presenting the most minimal sort VR application with a 486 computer, using very low tech 3D viewing devices and a modified Mattel Power Glove for the tactile interface. But perhaps this was the point, in that this represented accessible technology that almost anyone could afford, and yet gain a useful understanding of VR applications and concepts.

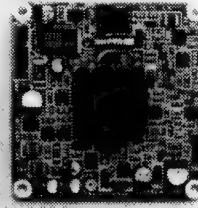
The last "official" day of the show was sort of a family day type of affair. Thousands of people, from little kids to grandparents showed up, lined up all the way outside the hall, waiting for their turn to put on a glove and 3D headset, and look at something "virtual."

By this time, all sorts of calamities had happened. The complex SGI systems that were running the virtual snowboard had completely broken down. Various temporary setbacks having to do with power glitches and general equipment failure kept plaguing various other displays and eventually even the power glove on my system completely failed. In desperation, I loaded up an experimental 3D computer game that Michael Starks had given me, almost as an incidental afterthought, just before I left for Brazil. This turned out to be the hit of the show. Every kid

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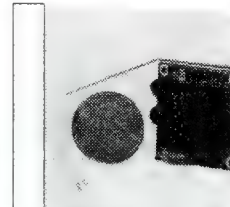
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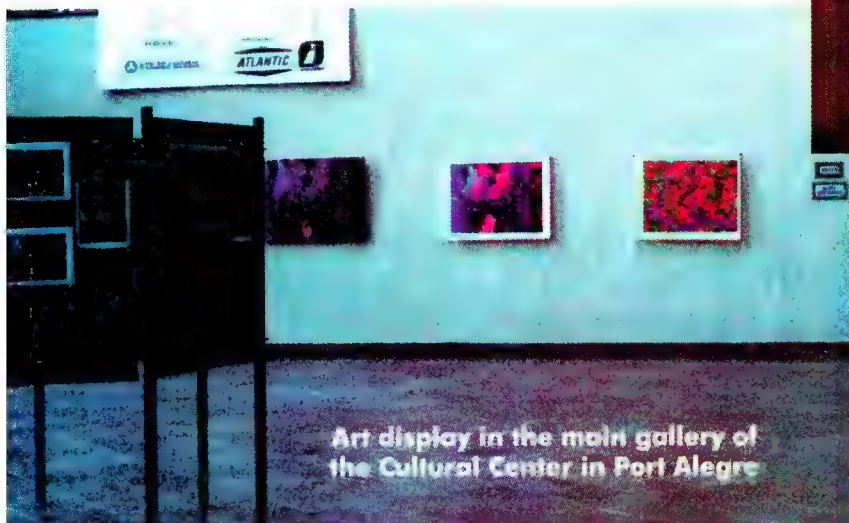
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On Time, Quality Design

that came up to the stage immediately wanted to check out the game. I kept trying to explain that it wasn't the game that was the point of the demonstration, but rather the 3D visual interface, and the general concept of VR. Well, whatever, everyone seemed to be having a good time. In that context, it was a total success.

The grand finale was an attempt to have a live dancer wear a motion tracking body suit supplied by Ascention and have her dance on stage to a live band. The intended result was to see a virtual dancer on the screen of one of the SGI machines and on the overhead projection system. As it turned out, half of the sensors in the body suit didn't



Art display in the main gallery of the Cultural Center in Port Alegre

work at the time, the dancer stormed out and refused to dance under such circumstances, and the band hung out for awhile, playing some sort of Brazilian metal rock music, and eventually left. Things eventually got straightened out and at least a video recording was made of the "virtual dancer" routine that could be presented later at Port Allegre.

After that first week in Rio, came a long needed respite from all of the attention and excitement. Most of the other presenters eventually left, but Bill, myself, and David Traub, a multimedia production expert and participant in the event, were invited out to the personal estate of our host. Into the van we all crammed, and I got my first real glimpse of the countryside during the 4 hour ride to the coastal resort town of Buzios.

It was here that the entire Brazilian adventure took its most unexpected turn of events. This beautiful resort was the scene of the tragic disappearance of Bill Riseman into the ocean. Just the night before, we had spent the entire evening, sitting out on the lawn, having a conversation covering everything imaginable from technicals of VR development to pondering the fate of civilization. Little could I imagine that 12 hours later there would be search helicopters and ships looking for the remains of this extraordinary individual. This was perhaps one of the most mind altering experiences I had ever had to contend with.

Without covering a myriad of specific details, the next few days, which were intended to be relaxation, turned



"Video Creature" media performer at the Rio VR

out to be intense and unnerving beyond description. We had both been scheduled to continue on to Port Allegre to give another series of talks and presentations.

I finally decided to continue on to Port Allegre alone. Here the audience was notably different. People had come into the city from hundreds of miles away in some cases. The governor of the state, as well as the mayor, and the cultural minister of Brazil, were all present. Port Allegre is a major technology development and educational center. I was thoroughly impressed with the super computing facility there, which featured a very modern Cray Y232 super-computer, and the latest SGI Elan rendering engines.

The people there are highly intelligent, very motivated, and during the course of the next several days of lectures I was repeatedly impressed by the serious, technical nature of the questions being asked. This was a sincere, and focused audience. Of particular note was the collection of young computer "hackers," high school age kids, both male and female, who came up to the stage with actual code listings, and even sample VR programs they had written. I met a young college student who was actually pursuing a PhD in computer science, with a specific focus toward virtual reality development.

I found Brazil to be a very diverse and complex country, which has had more than its share of economic and social difficulties. But, the people I encountered proved to be very resilient, intelligent, and absolutely serious when it came to education and economic development. It would be foolish to underestimate the potential that people of this country could offer in the future.



Charles Ostman has over 20 years working with electronics, computers, and physics, including 8 years at the Lawrence Berkeley Labs at the University of California. He may be reached at 510-549-0129 or charles000@aol.com

Newly Independent

According to the news last night, unemployment is up from the previous quarter. They showed people standing in a line waiting to get their unemployment checks. As I was looking at these people, I just thought they looked so helpless and kind of pathetic — just waiting for someone else to take care of them. They were unable to take care of themselves. And yet, 9 years ago that was me standing in that line. I never dreamed, at the time, that I would end up working for myself.

My profession is working on airplanes as an aircraft mechanic and authorized inspector. I have to work with the federal government. Being an independent entrepreneur in this field didn't seem to be a real practical thing to do because the government works with other agencies rather than with individuals.

But recently, the rules have started to change. I now work directly with aircraft owners, providing annual aircraft inspections and 100-hour checkups. Customers, more and more, are working with me and learning about their aircraft. They are more involved today and ask me serious and relevant questions. I do a lot of work with Fixed Base Operators (FBOs), supervising and signing off major repairs for other independent aircraft mechanics.

Another new direction for me is teaching. I recently started a 2-day workshop on *Aircraft Maintenance for Pilots*, which will teach them pilot/owner rights and what they can do under the regulations. They get hands-on experience — under supervision — to get them past the fear and a certificate showing success.

Since I have over a decade of experience rebuilding jet engines, I can

by Mike Witte

now offer independent third-party inspections for banks and corporations considering buying an aircraft. The FDIC is mulling over a rule change requiring an independent third-party inspection on all aircraft loans over \$180,000 — they've gotten burned on junk too often.

The Employment Mindset

It's hard — when you've been a cog for so long — to ever think of yourself as maybe being a wheel. I look back now and remember those helpless feelings that I had — the same ones I saw on TV — as some kind of learned helplessness. Society itself seems to teach us not to rise above the normal. So, going into business for myself was something I never intended to do. But, life has a way of driving us off that "normal" road.

First there was my cancer surgery. Then there was my wife's triple-bypass heart surgery. As if that wasn't enough, my two-year-old daughter needed surgery to prevent blindness and she almost died during the operation. My fellow workers started to credit me with being the cause of our company's health insurance premiums doubling.

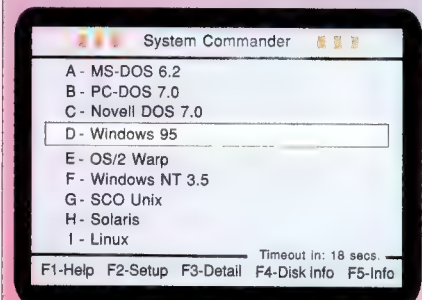
Another sickness and I was laid off. Nobody said it was because of the health problems, but as I tried to get work elsewhere, it inevitably came down to the health problems in my family — I was virtually unemployable. The American Dream of having my own business changes all this. Not only do I employ myself, but I also have the freedom to set my own hours. Sometimes I have to put in long hours, but I can stop/start when I want. I can work late at night.

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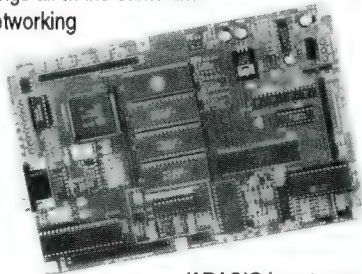
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But, the real bonus is the freedom to take time off and spend it with my children when they are little — that's important to me. Taking off at 2pm to go to their school basketball game or the school play is something I could never do when I was "employable." Now, I can reschedule myself without asking someone's permission.

Much of my time and energy used to be soaked up in the employee/employer interface. In those days, I had to deal with rush-hour traffic and being one minute late for work. Then there's the boss's son and his neurotic girlfriend, the secretary. My favorite example was when the boss's son required one of our customers to pay for a engine rebuild with a cashiers check before picking up the engine. Then the son left the check in his shirt pocket and his wife washed it into something that looked like a spit-ball. The customer had his engine and would not replace the check. We never did get the money. Consequently, we did not get any raises that year, but the boss's son was not held to blame. I'm much happier now that I take the full responsibility for what happens in my business.

New Freedom Breeds New Directions

More and more, aircraft are starting to use computerized stuff. Soon, a traditional aircraft mechanic won't be able to work on half the airplane. I wanted to stay ahead of that trend, so I started reading books on microprocessors and playing around making printed circuit boards.

I found out the hard way — through trial and error — that the book authors weren't always right and that the kid at the local Radio Shack knew less about making PCBs than I did, but was willing to sell me incompatible stuff just to make the sale. After getting maybe 5% out of each book I read, I started experimenting with surplus chips — breaking them apart and finding out for myself that PN junctions emit light from within an EPROM when I hooked it up backwards. Through first hand experience, I found that connectors are one of the main sources of electrical problems — eliminate connectors and you eliminate 90% of your problems. Likewise, I found many other personal experience lessons like the flaky pull-up resistors that cause intermittent problems, but check out fine when you probe them.

Like many Midnight Engineers, I have more ideas than I can find time to work on. Here are a few areas that could use some attention. Someone might want to work with me on these or just take the idea and run with it.

How about placing conductive traces on spars and other critical parts of an aircraft? By using a Time Domain Reflectometer (TDR) we could check for deformity and cracks. With these traces in critical locations, we could take a signature of what that part looks like so that it can be compared at a later date. The TDR sends a high rising pulse down a trace and if it starts to neck or break, the reflection shows up on the CRT trace. Not only would a product or process like this save lives, it would greatly reduce maintenance costs on airlines.

Aircraft have to be loaded a certain way, so that it will have balance and be light enough to still get off the ground.

How about taking strain gauge bolts and sticking them in the landing gear and then building a gauge that would show the weight and balance as the aircraft was loaded?

How about fiber optic gear-down indicators so you could be sure your gear was down and locked even if your electrical annunciation system had failed?

Or, how about a fiber optic tach for the prop? Then, of course, there is my favorite one where we use glass fiber optics to eliminate ground loop problems and expensive compensating resistors in Turbine Inlet Temperature and Exhaust Gas Temperature systems. There is also a need for business software for mechanics.

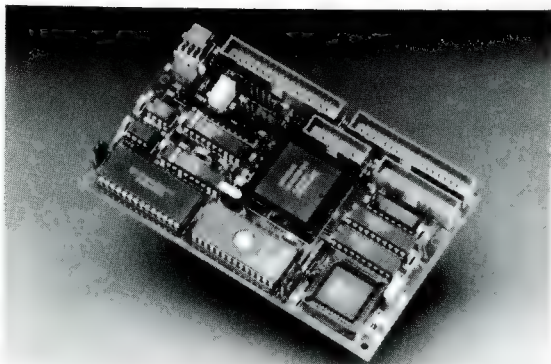
Even though I work in a highly regulated area and have to follow extremely stringent regulations, tools don't need to have any kind of government approval. If I build an instrument however, it may take me a year to get a Supplemental Type Certificate (STC). But, then I can sell kits or the data to others — who want to do what I got approved to do — and the FAA will steer all these people to me. They won't give another approval to somebody else.

I'm getting more ideas than ever before. Now all I have to do is find the time to work on these and other ideas for combining aviation and computers.



Mike Witte lives in Oregon and he may be reached at 503-359-0622.

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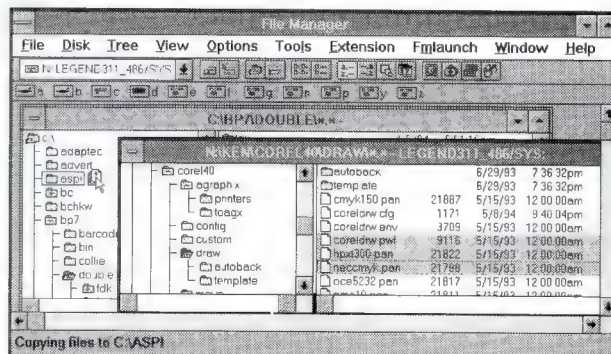
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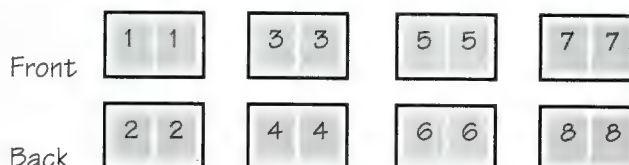
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Entrepreneur On The Move — 3

Derivative Product Development

Manhattan is finally starting to get used to me. After three months I've managed to cut back on expenses, pay off the credit cards, and even lay out my budget for the next year. I'm even just about ready to release a new product. And somehow I've even managed to have a little fun! I don't know how I'm going to pay my taxes in April, but that's just one of those little details that should take care of itself.

My second experience with Amtrak was a trip to Washington, DC. It took three hours to get there and four hours to get back. The return trip took longer because I bought a much cheaper ticket. Not a bad experience. Much more scenic than flying.

The product is basically a repackaging of my current product.

Most of my efforts in these three months has been focused on consulting to pay the bills and my moving and startup expenses. Now I have a little breathing room and can expand my thinking.

Hard Disk Warranties

I solved my hard disk's intermittent problem by calling the vender's tech support line and explaining the problem. They asked a few questions

and had me try a few experiments. The conclusion was that the drive would unexpectedly "spin down." Their solution was for me to ship the drive back and ship me a replacement. The drive is under a five-year warranty. Since I didn't want to be without a drive, I gave them my credit card number as "security" and they shipped the replacement overnight with the caveat that if I didn't ship my drive within ten days then I'd get charged for the replacement. They charged \$25 for shipping. The drive came and works, so I'm back and running! All I had to do was restore from my backup tape.

New Product

Last summer I had just about finished a new software product and was deciding how to market it when I began considering my move to New York. I put the product on the shelf with the idea that I would begin marketing when the move was complete (or aborted.) As I began to feel settled down late in November, I decided to go ahead with the product. It had a few features left to complete, but it was close enough.

The product is basically a repackaging of my current product, an interpretive, C-like object-oriented programming language and class library called Liana, to be a dynamic link library which can be called from C/C++ applications which want to dynamically interpret expressions and macros or scripts. You could use

by Jack Krupansky

it to add a macro or scripting language to your application. Or just use it to evaluate user-supplied expressions.

I decided to take a low-budget, go-slow approach to marketing. My best response for Liana had been advertising in *The C Users Journal*. Since I had exposure there and the rates are reasonable I decided to run an ad for three months. But after making the decision and then thinking about it I changed my mind and went ahead with a full one-year contract to get a cheaper rate. If I don't get good response within a few months then I'll redesign my pitch and possibly reintroduce Liana or offer some sort of bundling. My other reason for taking the longer contract is that sometimes you really do just need to be patient and hang in there. Another goal is to catch the eye of some larger company that might be more interested in licensing the technology.

Even though my ad isn't out there yet, I've got my first order, from a guy in Australia. This helped me focus on getting the product finished and I shipped it to him yesterday. He says he heard about it on the Internet. But I never put anything on the Internet! I did submit a listing (free) to the *Microsoft Systems Journal* Windows tools catalog. That listing got included in some other Windows or OOP list which in turn was

placed in a "web" page on the Internet.

Naming and Trademarks

The original name for my new product was LMACRO. The "L" stood for Liana, my existing product. The "MACRO" expressed the fact that the product enables applications to offer their users a macro language. My product is an example of an "embeddable macro language."

But after talking with a friend we concluded that "macro" was not a good choice since C already has

I am reluctant to fully embrace the Internet, but do find parts of it very useful.

"macros." So I decided to go with the alternative word which is "script." In other words, my new product is an "application scripting language."

Since the primary market is C/C++ programmers and my language is very similar to C, I decided that I really wanted the product name to begin with "C-". The result was C-Script. Since there are already a lot of "C-" products I decided to do a little due diligence. I looked in the Programmers' Shop catalog (and even called them since not all the products they carry are listed), talked to a friend, and called one of the other C-xxx vendors. The result was positive, no one had heard of a C-Script. So I put the name in the ad and shipped it off to the magazine.

Then I thought some more and decided maybe I should talk with my attorney. I decided to go ahead and do a low-cost "common law" search which scans a database of periodicals for phonetic matches. That would uncover trademarks that may have common law protection. No match on "see-script," which merely means the name has not recently appeared in print. I decided to go ahead with a federal search (which means that my attorney paid a search firm to do the

search.) Bingo. A software company in Alabama registered "C/Script" eight years ago and has kept its registration current. Back to the drawing board.

At first I decided to give up on "script" and looked for synonyms. I considered "Talk": C-Talk (as in Smalltalk), but rejected it since in my mind "talk" is associated with voice and natural language processing. Since "rap" is similar to talk I tried C-Rap, but I'd quickly get tired of explaining that it's pronounced "see rap," not "crap."

I talked with my attorney some more and we concluded that I could keep both the C and Script if I stuck some verbiage in the middle. Not only must the mark look different, it must also be pronounced differently. The goal of the law being to prevent consumer confusion between two products.

Since this is a Windows product, I tried a "w": C-wScript. Clumsy and not very pronounceable. I added an "o" for "object-oriented: C-owScript. But I wouldn't get much benefit from "cow script." I dropped the "w" to get "C-oScript," but that had no real association and is in fact a registered service mark for promoting prescription drugs. But "co" did remind me of "code" and "code script" definitely has a strong association with the purpose of the product. I considered "CodeScript" without the hyphen, but then realized that "C-odeScript" also associates with "ode" which is a lyric poem and captures the essence of scripts being more approachable than reams of code. I pondered the hyphen and this "ode" thing and decided this was one of those 50-50 decisions where a "wrong" decision is unlikely to significantly affect the outcome. So it's going to be C-odeScript.

My attorney ran both searches again and it came up clean. I automatically get common law protection when the mark is "used in commerce" (i.e., sold.) But that protection is not absolute and limited to geographic localities where sales have occurred. I considered registration, but we decided to wait until

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                             ; (Halt when ? printed.)
mov     dx,offset data_4
mov     ah,9
int     21h               ; DOS Services ah=function 09h
                             ; display char string at ds:dx
mov     dx,19h
mov     ah,31h
int     21h               ; DOS Services ah=function 31h
                             ; terminate and stay resident
                             ; al=return code,dx=paragraphs
vhrstst     endp

int_17h_entry proc far
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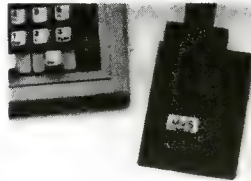
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product sales really take off. Federal protection begins from the date of filing. But the availability of the mark does not assure registration since it must be reviewed by an "examiner" at the Patent and Trademark Office and they might reject it for their own reasons.

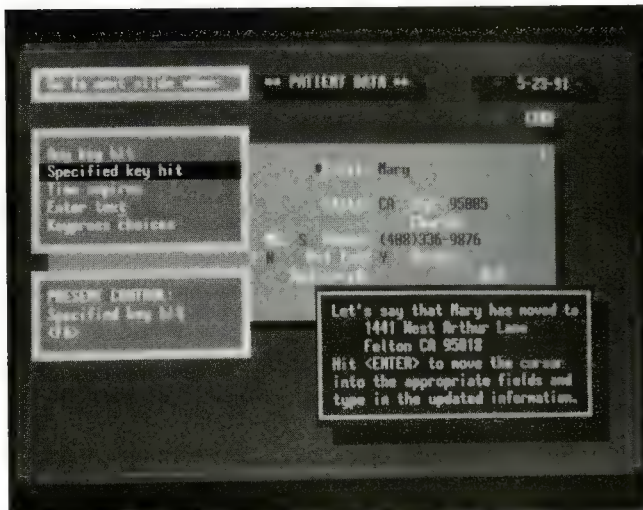
Internet

Now that I had my revised product name, I had to ship the revised ad artwork to the magazine, well past the artwork deadline. Internet to the rescue! I developed the ad using Word and kept it simple with no fancy graphics or oddball fonts, just variations in the standard Windows typefaces, point size, bold, italics, borders, and backgrounds. I told Word to print to a file for a PostScript printer and e-mailed that file to the magazine's Internet address from my CompuServe account. I had them fax back the printed ad to make sure it got through okay. No problems.

I am reluctant to fully embrace the Internet, but do find parts of it very useful. Through CompuServe (which costs me \$10 per month) I can receive and send Internet e-mail. In theory, all this web stuff will be available within the next year. It sounds good, but performance and capacity are unsolved issues.

I'd really like to "do business" on the Internet, but I think it will be awhile before the economics compete with what I can get today for an under \$500 per month ad going to a focused audience.

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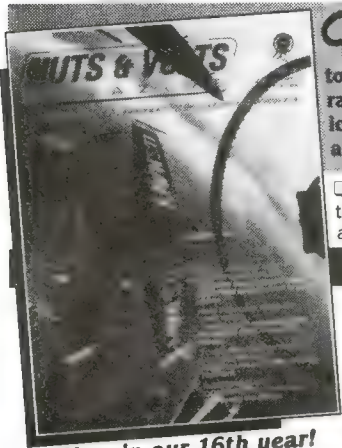
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Contacts in New York

I got a call from a guy who saw one of my articles (in another magazine) and called me to get some advice concerning marketing of his company's proprietary programming language. We talked a bit and he asked if he could stop by my office to continue the discussion. I was a bit surprised that he'd be willing to come all the way to my office. I asked where he was located, thinking he was probably hundreds or thousands of miles away, and he said "downtown" — right here in New York. I still haven't gotten out of my mind-set of being isolated in the mountains of Colorado.

Due to my intense focus on settling down, I hadn't gotten around to making contacts in New York yet. But this out-of-the-blue call has reminded me of what I need to do. I met with the guy, we discussed our products and mutual interests, and I'll be visiting his office in the near future. Maybe being in New York really will pay for itself.

Short-term Projects

I got a call from a licensee who has been interested in my technology for some time and always not quite ready to go forward in a big way. In addition to buying a copy of Liana, we negotiated a source code license for portions of my technology to be combined with his product. But now he has two short-term projects that would have modest short-term payback. For one project I would be a

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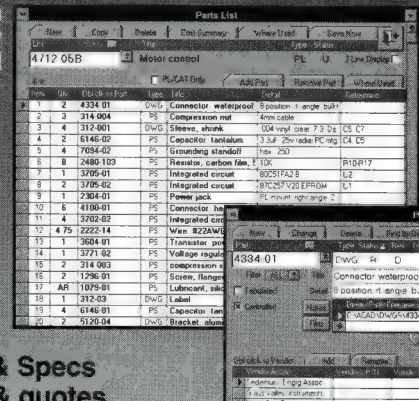
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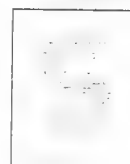
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sub-contractor for development of a GUI application for one of the stock exchanges. Not very exciting, but it would pay hard currency that I could really use on April 17th.

The other project involves mock-uping a GUI interface for a traditional non-GUI programming tool. If the mockup and presentation go well, more dollars could follow. But the real payoff is that this project would help showcase the advantages of my technology. Although our relationship has not yet born significant fruit, I just have a feeling that this is just one of those situations where patience and persistence win.

Project X

I assume everybody has some "Project X" which is an idea that is so far out that: 1) it would be difficult to pull off, 2) it would require more resources than we have available, 3) it would be extremely risky and unlikely to succeed, 4) close friends, associates, experts, and loved ones would laugh at it, 5) it would be a

really big success if you could pull it off, and 6) it probably would succeed if only we would get our act together, get started, and stick with it.

So I've got this idea that would involve a mix of hardware and software. It's potential applications and low-cost are mind-boggling. Lots of potential for patents and technology licensing (and associated legal battles.) So, what's holding me back on my Project X?

One obstacle is resources. The project really needs (or at least I think it needs) full-time attention. I can't do that and still pay my bills. Then there is "technology convergence": even if I had the money I couldn't build it since it needs better/cheaper components than are available today. Also, I'm too busy on my other projects to drop them and risk everything on my crazy idea.

But of course the real reason I have held back is that I just haven't made

the decision to go forward. Even if I can't build it today, I can still do the design and be ready to hit the ground running as soon as the relevant technologies have converged.

Even more significantly, maybe I just need to break down my grand idea into more manageable pieces and focus on a stripped down version

Maybe I just need to break down my grand idea into more manageable pieces and focus on a stripped down version which could be built today with my limited resources.

which could be built today with my limited resources.

Going Nomadic

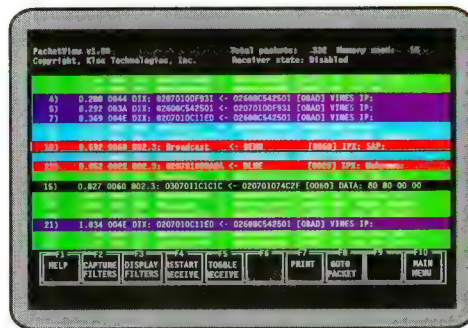
Now that getting settled in New York, it's time to think about where to move next! I'll be here at least for a year, maybe two. Actually, I'll stay till I'm bored. There are a lot of places I'd like to live for awhile, such as London, Paris, and Hong Kong. In truth, I really don't want to live anywhere, but would prefer to live a more "nomadic" existence. A month or two here and there, never sure where I'll be in three months. There are several obstacles. There are lots of people who are "mobile," but they do depend on a "base" for support. When I say nomadic, I mean living without having that base to fall back on.

First, although laptop computers are advancing rapidly, I always seem to need just a little more. Currently I am developing heavy-duty multimedia applications with CD-ROM and an add-on MPEG decompression card. I'm also into Windows NT. I'm using most of my 1.7GB disk and dependent on my DAT tape backup. My current client may get me a loan of a Panasonic notebook that has a 500MB disk, internal, full-size CD-ROM drive, and MPEG decompression cartridge. Even assuming my

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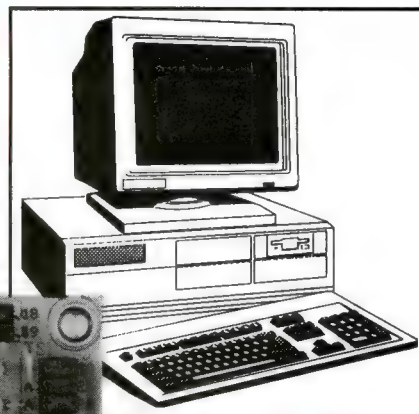


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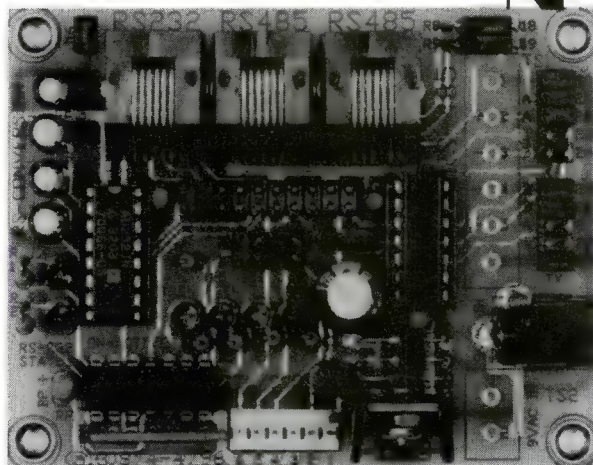
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NYC Entrepreneur

hardware fit in a notebook, I have stacks of CD-ROMs I'd have to lug around. The Microsoft Developer Network alone comes with sixteen CD-ROMs! They're worse than floppies. I need the true Information Superhighway. Maybe next year.

A second obstacle is trying to run a business without an address. I probably could arrange some sort of service that would receive my mail and handle typical paperwork.

Then there are all my paper files. I'd like to scan them onto CD-ROM. Then there are books and manuals. A lot of documentation is appearing on-line, so that obstacle may quickly go away. And when software gets distributed via the Infobahn then I can really break loose. One prospect is that you could download portions of applications as needed rather than clutter your disk with the 85% of a typical product that you don't need.

Then there is all my junk. I really don't have too much, but there is more than enough. Actually, most of it is still out in Colorado in the basements of various people. I think I could get by with a trunk for clothing and CD-ROMs. And I probably don't need many books — they're available in libraries or bookstores and aren't terribly useful anyway!

Accommodations are an issue. I don't think I'll be making enough money to stay at luxury hotels all the time (\$250 per night is \$7,500 per month or \$90,000 per year) and I don't think I'd like the hostel thing or camping. Even a really cheap motel at \$35 per night would cost more than my apartment in New York. It is possible to find short-term rentals, but the price is much higher than a long-term rental.

Then there are things like drivers licenses, voting, health care. Although I no longer have a vehicle, didn't vote last year, and don't have any health insurance anyway.

Hmmmm... Maybe I really could pull off this nomadic thing when I leave New York in a year or two. At least it's a challenge worth considering.

So what will my priorities be tomorrow? First, my bill-paying consulting. Second, trying to clean up a lot of little loose ends in the new product. Third, think about how much time and energy I want to spend on short-term income boosters. And fourth, set some goals for Project X. I suppose I should formalize my "to do" list for going nomadic so I'll know how close I am as each element of technology begins converging.



Jack Krupansky runs a one person software business, Base Technology, which develops and markets the Liana object-oriented programming language and offers Windows software development consulting. He may be reached at 212-626-6630, Fax at 212-626-6632, e-mail at 70642,2662 on CompuServe, or snail-mail at 1120 Avenue of the Americas, Fourth Floor, New York, NY 10036.

Credit Card Processing

by Jim Krause

Accepting Credit Cards Will Increase Your Sales

Previous articles have discussed that most businesses have found accepting credit cards (American Express, Discover, MasterCard, Visa) substantially increases sales by taking the immediate cash availability factor out of the prospective buyer's decision making process. With credit card acceptance, the prospective buyer only has to decide if your product will be beneficial and is the price appropriate in relation to the perceived benefit. The customers present lack of cash availability eliminates numerous sales opportunities that could be closed by accepting the prospective buyer's credit card! This is especially important for speakers and seminar providers in promoting sales of their seminars and back of the room products!

Phyllis Shelton, President of Shelton Marketing Services, Inc. in Antioch, Tennessee responds, "Approximately one third of my business comes from buyers using their credit card for payment. I have arranged a national tour of twenty-three seminars and that tour would not be possible without my merchant account! The seminar attendees reserve their seat in the seminar by giving me their credit card number over the telephone. They can also use their credit card to buy my *back of the room* products before and after the seminar. If they didn't buy my products while at the seminar, they can still call my office later and give me their credit card number and receive the product in the mail within days. My ability to accept credit cards is a critical piece in the success of my company."

But what if a merchant goes to his local bank requesting a merchant account and they refuse to sponsor him to the Visa and MasterCard acceptance system? Visa and MasterCard won't deal with the merchant direct. The merchant must have a member bank basically co-sign the merchant agreement to obtain a Visa and MasterCard merchant number. A large percentage of banks are not Visa and MasterCard draft acquisition member banks.

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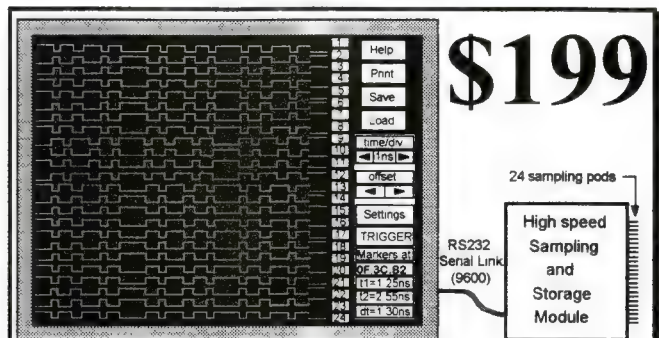
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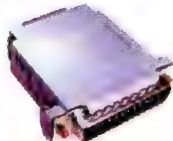
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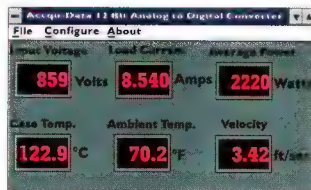
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Merchant Accounts

These banks should find a reputable referral source and refer their merchants needing credit card acceptance to that referral source. The merchant's credit card processing funds can still be electronically transferred daily to the merchant's local bank account but that bank will have no liability for the merchant's transactions.

But what if a merchant's bank is a Visa and MasterCard member bank but still refuses to sponsor the merchant to the system? Most member banks have very strict guidelines regarding which merchants they will sponsor, and a large percentage of merchant account requests get turned down. Common reasons for turn down include: too short of a time in business; business operating without a retail store front; business taking telephone or mail orders; non-acceptable product types; too small merchant volume; and even too large of a merchant volume. But don't despair! A little persistence and proper presentation to the right bank can still get a merchant number for these merchants.

Steve Squadere of Cellular Works a cellular phone and accessories retail store in Cypress, California had been processing Visa and MasterCard via in-person magnetic swiped transactions and had an excellent record of properly handling Cellular Works' responsibilities in conjunction with the merchant account. However, when he asked his credit card processor for approval to do non-magnetic swiped telephone and mail order transactions they said "No." Steve relates, "I thought my plans to increase business and expand my service territory by advertising cellular accessories via telephone orders were doomed." When Steve called me, I assured him that Cellular Works could get approved for telephone and mail orders. One week after the owner of Cellular Works signed the Merchant Agreement, Cellular Works was approved for the merchant account.

Most banks do not have the proper expertise or desire to set up and watch the "daily exception reports" and monitor a merchant credit card processing portfolio. Consequently, they try to take all the risk out of their portfolio by establishing strict guidelines on which merchants they will sponsor to the Visa and MasterCard system. They require the merchant fill out a large package of paperwork and submit it with recent financial statements and previous years tax returns. The merchant bank card department then takes weeks to review this package and usually comes up with some additional hurdles that they want the merchant to jump over!

Only the most stable and financially sound merchant can withstand this scrutiny and ultimately expect to be awarded a merchant credit card processing number. However, the few banks that have properly set up a system of watching the daily exception reports and computer monitoring of the merchant's transactions can feel confident in their ability to stop merchant fraud and avoid merchant bank losses. They do not require a thick application package and can quickly perform a required "due diligence" on the merchant. Merchant processing applications are usually approved in less than a week. These

banks usually do not require financial statements or copies of tax returns.

The bottom line is: Merchants need to accept credit cards to capitalize on every sales opportunity, but should not be discouraged when their banker says "No" to their request for a merchant account. Consult an expert in the merchant credit card acceptance field and get set up with a minimum amount of hassle. *Accepting credit cards will increase your sales!*

ME

Jim is President of Axin Financial Services, Inc., an equipment finance leasing company specializing in merchant electronic draft capture equipment. Axin Financial Services, Inc. is a Member of the Bankers Network-Inland Empire (36 Member Banks) and the California Bankers Association Bankers Educational Forum - Orange County Chapter. Jim Krause is also a Sales Representative of Card-service International, A Registered Agent for Humboldt Bank, Humboldt, CA and Redding Bank of Commerce, Redding, CA. Axin's CompuServe ID is #74271,1045. Jim can be contacted at 310-694-0565 or at Axin Financial Services, Inc., 581 Charwood CT, Brea, CA 92621.

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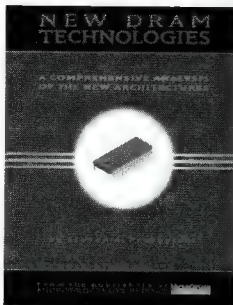
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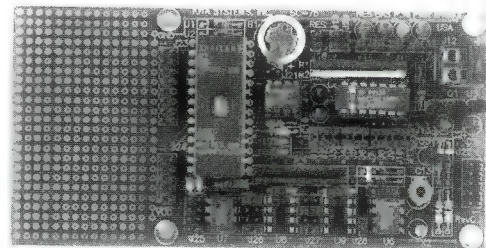
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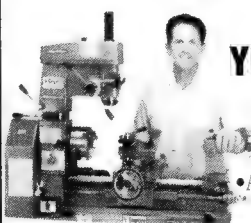
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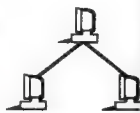
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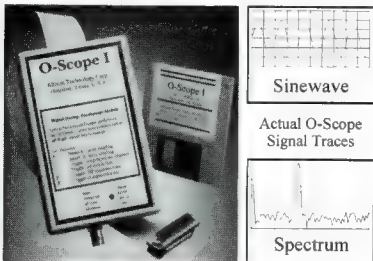


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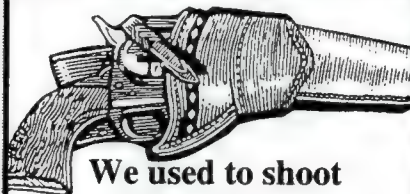
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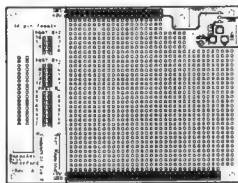
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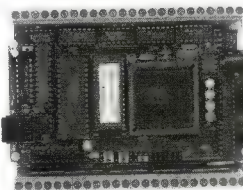
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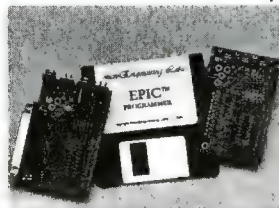


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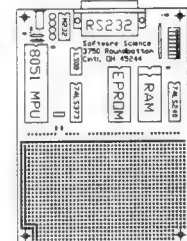
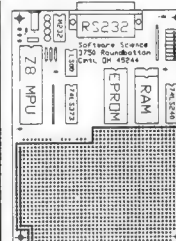
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Engineering Ratholes

by Don Lancaster

There sure seems to be an awful lot of really bad engineering coming down lately. Such as a short range missile that uses many *dozens* of slip rings. Or a zillion dollar remote infrared sensing system which replaces a penny's worth of temperature sensitive paint. A solar panel that generates electricity solely to *resistively* heat water! All to avoid a thirty cent drain valve.

A new "ultra efficient" engine. That seemingly avoids a minor motion conversion *non*-problem. While introducing insulated liquid sodium, magnetohydrodynamics, magnetic bearings, and incredibly complex electrics.

Charging Madness

Or get this: An expensive and high profile ad campaign. Shows a ridiculously overdressed female. Standing beside a gas pump shaped power source. Holding a gas hose shaped cable. Plugging a gas nozzle shaped connector into an electric car. What is wrong with this picture?

Well, electric vehicles *will* autocharge. Unattended and contactless. From below. Not only is human intervention totally unneeded, it is quite costly, unsafe, inconvenient, and time wasting to do so.

Even the very concept of going someplace "special" to recharge your car does not make any sense at all. Card operated charging stations will end up *everywhere*. Every parking lot will have several. About the only place you'd be *unlikely* to find one is at a gas station.

U-turn Insanity

It seems someone has patented a "U-turn" indicator for cars. Whenever you want to make a U-turn, you'll flip a special switch which progressively lights up a large rear pointing arrow.

Which gets me to thinking: How often does the average driver make a U-turn? How many people genuinely and truly care about telling the traffic behind them every time they make a U-turn? What percentage of the time will they do so? What is the amortized *per-turn* cost?

What is its investment payback period?

More importantly: When a random and unknown driver is presented with unexpected and confusing inputs during a high stress situation, will accidents *increase* or *decrease*?

What are the consequences of one litigious driver?

Now, I do not want to prejudge the answers to all these questions. U-turn indicators could see a groundswell of popular demand that rockets them into becoming the killer ap of the millenium. But your key point is that all these questions should have been asked – *and answered* – very

early in the product development cycle.

The patent, of course, is utterly worthless. It describes something completely obvious to any practitioner in the field. Worse, if such a device were really built, it would be as a *generic* icon display system, capable of *any* message or symbol. Rendering all patent claims moot.

The Ratholes

One way to avoid bad engineering is to stay away from energy sinks into which bunches of time and money have previously been dumped with no visible effect. I like to call these *engineering ratholes*. Let's look at a few of the more popular examples coming over my voice helpline...

Thermoelectric coolers– The solid state *Peltier* coolers are certainly useful. When only *tiny* amounts of heat need be moved from point A to point B. But there is an absolute brick wall around eight watts or so. These devices are ludicrously inefficient. Often, five watts of heat have to be dumped to provide one watt or less of cooling. At high power, this causes your heatsink *rise* above ambient to *exceed* your net device cooling drop! (HACK68.PS)

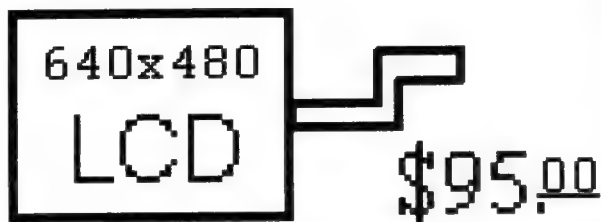
Stirling engines– Every few years somebody rediscovers the Stirling engine. They build a few prototypes which just barely fail to work, and then just barely go bankrupt. The promise here sure is enticing. A low delta-T engine which accepts anything from oily rags to sunlight.

But there's two fundamental gotchas here. First, *any* engine designed for a low ΔT temperature differential is *inherently* inefficient. Carnot and all. More crucially, there is a key component to a Stirling engine that nobody – but nobody – has figured out how to build yet. It is called a *regenerator*. A regenerator has to be long and thin and short and fat. Not to mention being an excellent insulator and a superb conductor. (HACK64.PS)

Subsurface radar – It is extremely difficult to couple any electromagnetic signal in to or out of the ground. Firstoff because of direct losses. Second because of severe coupling mismatch at the earth-air interface. And third because water has an enormously high dielectric constant. As a result, your effective ranges will *always* be ridiculously shorter than you'd first suspect.

Any "treasure finder" that claims a penetration greater than its length or whose resolution is less than one-tenth its sensor head size is highly suspect.

Hall compasses– Low cost sensors based upon the *Hall Effect* are really great for use as position pickoffs, current



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Bad Engineering

monitors, or similar aps involving *strong* magnetic fields. But these are a *thousand times* too insensitive to be useful as a quality electronic compass.

Instead, *the* solution to low cost earth magnetometry is called the *fluxgate*. A saturated mag core with several windings. Been around for sixty years now, and still works like a champ. It ain't broke. (NUTS37.PDF)

Anything automotive— Sorry, kiddies, but this one is a closed club. Unless you are a SAE member, your father is a senior member, and your grandfather is a fellow emeritus, forget it. What's even worse is that all major players are dramatically *reducing* the number of their suppliers. And outsourcing engineering *only* to proven firms.

High power piezo— There are all sorts of wonderful new micropower aps for piezo stuff. Especially the great new materials from *Amp Kynar Piezo*. But except for a few resonant ultrasonic transducers, high power piezo seems doomed to failure. Indeed, every attempt at doing a motor or a stepper or a positioner beyond a one watt power level has been a commercial disaster.

The prospects for high level piezo power production are even more grim. Unlike a conventional "H-field" generator which produces a current through a conductor, piezo is an "E-field" machine which generates its voltage across an insulator. Guaranteeing an abysmal power density.

Qwerty vs Dvorak— The Qwerty keyboard was specifically designed to *slow typists down*. It has been one of the most ergonomically absurd designs of all time. But this one is so deeply culturally ingrained that *any* attempt to replace it is *guaranteed* to fail. You might bend it a little. Literally.

Or add a mouse substitute. Or argue over where to put the escape key. But *no way* are you going to replace it.

Proof of Qwerty's intractability? Most Apple computers let you instantly switch to a more ergonomic Dvorak key arrangement with a mouse click or two. Just try and find anybody anywhere who *ever* uses this feature.

Cold fusion— Died stillborn. Not only is their horse gone, but the barn door burned down and the entire farm is now a vacation condo. Pathological science at its bizarre worst.

Tesla stuff— Tesla was certainly one of the finest engineers of all time. Who developed both the induction motor and polyphase ac transmission. But he also was one of the greatest con artists this side of P.T. Barnum. And clearly was a few chips shy of a full board. There's a latter day cult built up around Tesla's "free energy" schemes.

Which flat out ain't gonna happen. (NUTS18.PS)

Other pseudoscience— If you've slept through Physics 101, the three laws of thermodynamics are: You can't win. You can't break even. And yeah, the dice are cooked, but it is the *only* game in town. Every attempt at perpetual motion to date has failed miserably. And virtually every other pseudoscience topic so far falls apart when given close enough scrutiny.

For a wondrously wacky tour of beyond the bizarre, check into the *KeelyNet BBS*. For a sanity check, go instead to the *Skeptical Inquirer*. (NUTS26.PS)

Fuzzy logic and neural nets— I sure enjoy watching Bob Pease slam these over in *Electronic Design*. Apparently,

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there *never* has been a real world Fuzzy Logic or Neural Net ap anytime ever that was even *remotely* as good as a well thought out traditional solution. To me, the whole field appears to be a huge smoke and mirrors scam.

Two key problems are that the math gets super ugly as the number of conditions go up. And that most proponents simply do not have the vaguest clue as to how a real world ap has to perform.

Avoiding Bad Engineering

How can you personally avoid doing bad engineering? Here's some guidelines that may be of help...

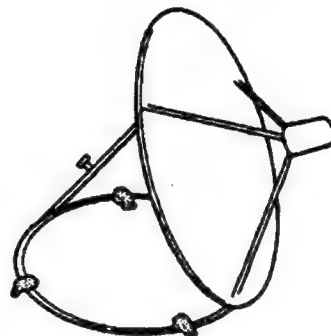
Get and stay informed— Be sure you *thoroughly* understand the fundamental underpinnings of your target field. Don't write a forest fire simulation if you've never sharpened a *Pulaski*. The best and cheapest way to get informed is with all those zillions of free trade journals listed in *Ulrich's Periodicals Dictionary*.

Get the necessary tools— It never ceases to amaze me how many callers are trying to repair a tv or interface a monitor without using an oscilloscope. Or how many are still doing old line analog designs. When digital has done the task faster, cheaper, and more flexibly for well over a decade now. It is unthinkable to research astronomy without a telescope and a computer. The same fundamental tool need applies for *all* technical ventures.

Ask who has gone before you— Your concept is *not* new. Others are *certain* to have plowed this ground before. Who were they? What did they say where? What do you know that they don't? By far your most cost effective tool to find published info is the *Dialog Information Service*.

Use online services aggressively— Experts in *all* fields are a few modem bytes away. From the Internet, commercial BBS services, or local labor-of-love setups. It is *totally* unthinkable to attempt *any* technical venture today without tapping these incredible resources.

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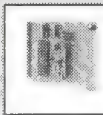
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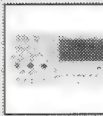


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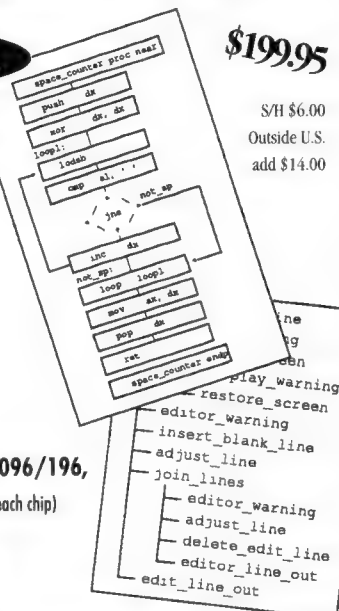
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Bad Engineering

Avoid the momentum trap— Your initial designs *will* be wrong and *will* have to be modified. Every time. For the "real" problems do not appear until well into beta test. If you do all your work *knowing* that changes are *inevitable*, then you are less likely to lock in a lousy design.

Beware the gotcha, my son— There is not much point in working on a concept that goes head on against a Fortune 500 company. Or is in a field that abhors innovation. Or goes against the cultural grain. Or is legislated to death. Or has strong alternates. Or a narrow pre-obsolescence market window. Or invites costly litigation. Or has no buyers.

Don't be overly enameled of your ideas— If you are very lucky, one of your concepts in *five hundred* might end up a commercial success. Ideas are worth ten cents a bale in ten bale lots. Since most of your ideas are *guaranteed* to fail, it will pay to ruthlessly get rid of them just as *soon* as you possibly can. Stomp them out.

No patents!— Patents are a totally unneeded sideshow. One which is virtually *certain* to make your concept fail. Focus your time and energy on developing and improving your product instead. Rather than fruitlessly chasing mythical "protection". (WHEN2PAT.PS & PATNTHOR.PS)

Shun paranoid secrecy— Working by yourself in the dark is a sure fire formula for failure. The only reason to keep an idea or a concept a total secret is that it is so awful that you'd be embarrassed to tell anyone about it.

Run a reality check— Who cares about your product? What need does it fulfill? Who would buy it? One sure test is to locate *five* people who will agree *in writing* to buy your product. More importantly, who gets really upset over your design? Does it confront the big boys head on?

For more help

Needless to say, any rat-hole can become an enormous opportunity. But only *after* you do thoroughly understand what went before. And only *when* you can bring something truly and genuinely new to the table.

Much more on all of these concepts shows up in my *Incredible Secret Money Machine II* and in my *Resource Bin* and *Blatant Opportunist* reprints. All of the mentioned filenames and continuing support on these topics appear on my *GENIE PSRT RoundTable*.

I've managed to wrangle a ten free hour trial deal just for *Midnight Engineering* folks. Per details below. ♦

Microcomputer pioneer and guru Don Lancaster is the author of 32 books and countless articles. Don maintains a no-charge technical helpline you'll find at (520) 428-4073, besides offering all his own books, reprints, and various services. Don has a free new catalog crammed full of his latest insider secrets waiting for you. The best calling times are 8-5 weekdays, Mountain Standard Time.

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RFPC — 5

Disappointed, but undaunted, I came very close to printing this issue of *Midnight Engineering*. Between each issue, I get 3-4 weeks where I can make a run at any project I choose. My current project is building a printing plant to print this magazine. Many times I find that I can't discern whether my hobby is my current project or this magazine. I like that blurring and intend to live most of the rest of my life in that state.

With the 100-foot long 150,000 lb monster 4-unit web printing press mostly bolted together, it was now time to try turning it on. Of course, you don't just plug it into the wall socket and flip some switch. This sys-

interlocks that promote safety and timely operation.

A major breakthrough occurred when I discovered some electrical schematics tucked behind a sheet-metal plate inside of the main system console. From the schematics, I could

by William E. Gates

this kind of main power distribution requires an electrical contractor (add another \$1500 for labor and materials to run 100' of 4" conduit.

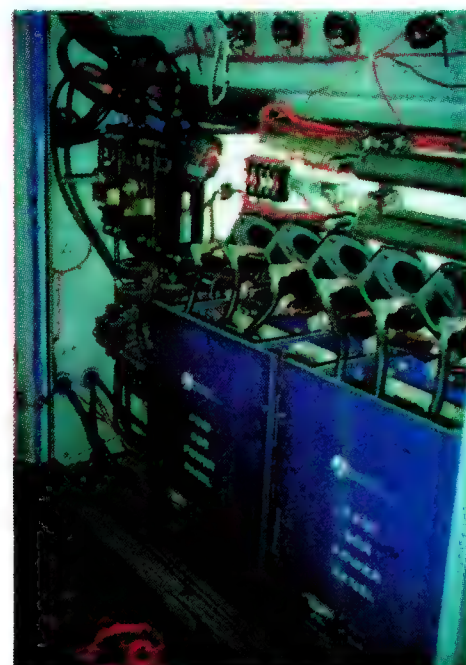
The County Electrical Inspector is a real nice guy, but rules are rules



tem is designed to be permanently installed, anchored in one spot, and run continuously for maybe 20 years. Just like any other large system, the power requirements are non-trivial and the startup sequence is predicated on a variety of conditions and

see the basic operation sequence of the power relays, transformers, and the AC/DC power conversion for the two 50hp motors via a pair of SCR units. There is still no operation or maintenance manuals, but with these schematics it would be much easier to power up this monster. Or, so it seemed.

Basic power requirements are stamped on a plate inside the main console: 220 VAC, 300 Amps, 3 Phase, 60 Cycle. Simple enough, right? Just run three -000- copper wires (each about 1 inch in diameter) and a ground wire from the 400 Amp incoming power (over on the wall) to the console (100' away). Simple, but expensive. The wire alone was about \$1000. Being a commercial building,



and he wanted a ground wire to run all the way from the power box on the wall to the point where the water pipe came in the building (200' away). This was going to cost nearly \$1000 additional for wire and labor. But

traceable from the point where the water pipe comes in the building to the point where the ground is picked up." We traced an overhead water pipe to a point within 40' of the wall-mounted power box, so I saved a net \$900.

This may not seem like much in the overall scheme of things, but remember that this is all an experiment. It doesn't matter how good I feel about it, or how much sense it will make for the press to work, I still could fail. If this whole project goes bust, there is not much to be salvaged from most of this power routing etc.

wait, the Electrical Inspector called back with a fine print exception in the code. "In a commercial building, the main power box may pick up the ground from an interior water pipe, if said water pipe is all metal and continuously visible and

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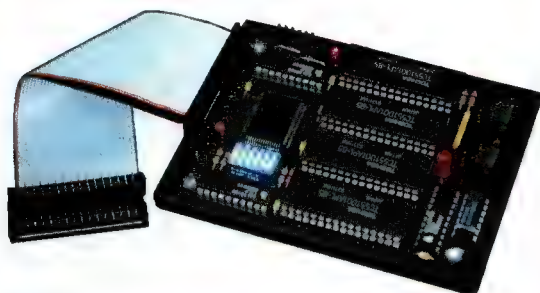
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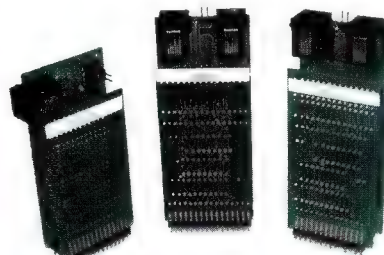
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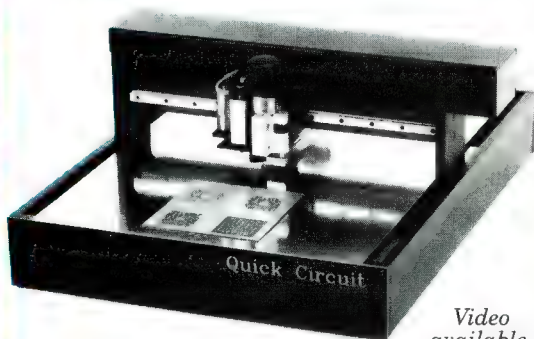
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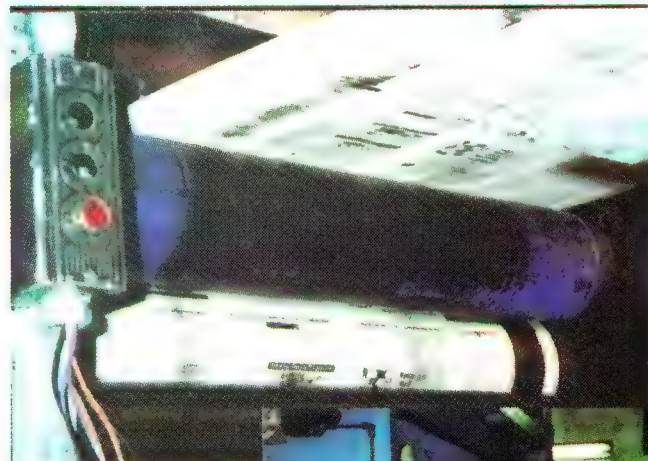
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Impulse Power Please, Mr Scott

Even though I worked on 5000 volt tracking and jamming radar systems in the Air Force 25 years ago — you know the kind where the first thing in the maintenance manual is an instruction to remove all watches and rings! — I paid the electrical contractors by the hour to hang



around while Yours Truly started going through the power up sequence. I figure these guys know CPR or at least can dial 911 if I get zapped.

First the big, red insulated lever on the wall power box gets shoved up to the "on" position to engage the 3-phase 400 amps to the console. A large lever on the back of the console engages a 300 amp circuit breaker and the red power light on the console lights up. Two ventilation fans in the console start up. So far, so good.

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I have the 50hp DC motors sitting right next to the console on a pair of short wires to keep this power up sequence simple. When I press the "run" button, an alarm bell on the console rings until the 2-second time delay relay engages, followed by a loud "clunk" as M1, the main contactor relay, engages to give AC to all the circuits in the console. A 3-second time delay relay engages and the whole console seems to hum, but the motor is not turning. Advancing the motor speed control doesn't have any effect. No DC to the motor is confirmed with a multimeter.

This is a major disappointment. It ends up that neither of the two big Silicon Controlled Rectifiers (SCRs) in the



console are putting out DC. These power supply "situations" are something I always dreaded, even when I worked on mainframe computers. Typically, power supply systems are not incrementally testable — it's all or nothing. Large integrated power supplies simply overload/crowbar when there is a problem with input power, output load, or an internal failure. To troubleshoot the internal feedback and load control usually requires a separate test jig. If one of the two SCRs had worked, I could have used the old subassembly swap routine to locate and fix the bad one. But, with both SCRs down, the problem becomes pure Electrical Engineering.

A large electrical supply and repair firm in Denver said that they would look at the SCR and could probably fix it in a couple of days. After 5 days, they still didn't know what was wrong. They had taken the control board out,

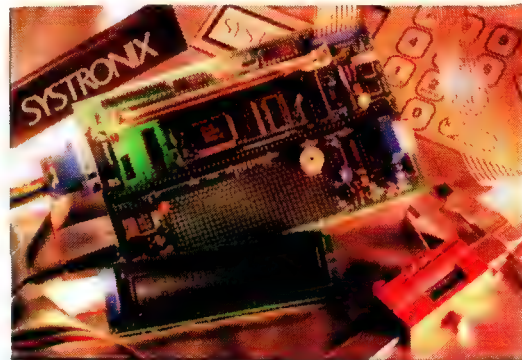
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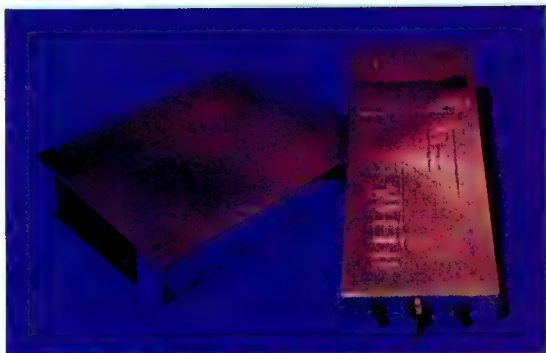
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sent it off to South Carolina for testing/repair. When the board came back, the SCR still didn't work, so they sent the control board back to South Carolina again.

Finally, after 10 days, I got my SCR back "fixed" for only \$600 in repair charges. Reinstalled, the SCR still didn't put out any DC. The technician in Denver suggested that I check the input phases on my 3-phase AC power.



Okay, I had resisted up to this point, but now I would have to do some real troubleshooting. My dual-trace 20Mhz scope had not been turned on in over 5 years, but it seemed like only yesterday when I dialed in the time-base, set the vertical scale, and synched on channel 1. It's not terribly difficult to get 60 cycle AC on the screen. But, when I connected the second AC phase to channel 2, it was 180 degrees out from the first phase. When I viewed the third phase on channel 2, it seemed to be 60 degrees out from the first.

Checking with the power company, they said I had "Y" power instead of "delta" power. This meant that each leg of the AC was 120 degrees apart with respect to each other rather than to ground. This was real cute. How do I view two phases, in respect to each other? I checked with several engineering buddies and they all thought that I would have to float the scope frame on one of the phases in order to do it. This seemed inherently dangerous to me. Maybe all you readers remember how to do this, but I was going to have to figure this for myself.

To make matters even more strange, I got a call from the printing company I have been using in Denver. They wouldn't be able to get paper to run this issue of ME for maybe a couple of weeks. For six months there has been a big paper shortage and prices have been going through the roof. Now we are looking at not being able to get paper at all. Do I want to run on better paper at a much higher price? Or, mixed paper that they can cobble together at a somewhat higher price? Neither is my reply. If I have to run something strange and run late, I might just as well try to run it myself — I can get off-brand weird paper myself if I have to.



I convinced my father to give me another week or so of his time for a desperation shot at making this monster run. He even bought into my idea that we could power the press by some other means if we had to (perhaps we would just hook up a power take-off on the rear axle of the old pickup truck). While he's flying in from California the next day, I get the power figured out. It ends up that by externally synching the scope on anything and placing one of the phases on channel 2 in "inverted" mode, I could then put the scope into "add" mode (functionally a "subtract" mode) and then connect channel 1 to each phase, in turn, and watch them walk across the screen at 120 degree separation from each other and determine the correct phasing to make the SCR happy.

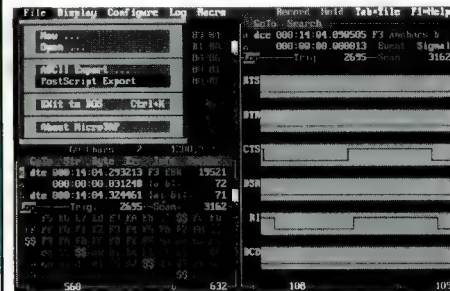
continued on page 76

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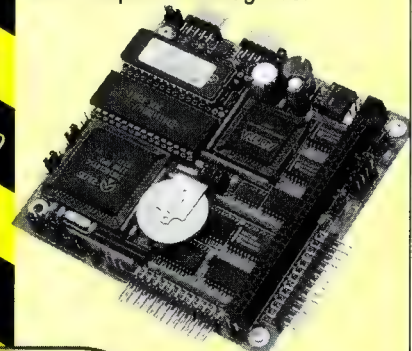
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Deducting Home Offices

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hether working at home or operating a home-based business, there are many expenses that are tax deductible — and a lot that are not. Not so surprisingly, the ever-vigilant Internal Revenue Service devotes quite a bit of attention to this area of our income tax laws.

First, no Midnight Engineer is automatically entitled to deduct the expenses of using a home for business purposes. Of course, if those expenses are attributable to a portion of the home (or a separate structure) used exclusively and on a regular basis as a place of business, expenses may be deducted — subject to limitations and restrictions.

The tax rules define a place of business as either the principal place of

the home space is used for both business and personal purposes.

The U.S. Supreme Court has ruled that deciding whether a portion of the home is the engineer or entrepreneur's principal business location requires comparing that location to all of the places that the Midnight Engineer does business. This is because only the most important, consequential or influential location can be the principal location under our present rules.

The Supreme Court has also ruled that while the ultimate determination of principal location depends upon the facts and circumstances in each situation, there are two primary steps that must be followed: Step One involves analyzing the relative importance of the functions performed

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Step Two, as outlined by the Supreme Court, is used if Step One does not result in a clear-cut answer. With Step Two, the amount of time spent in the home business location must be compared to the time spent in each of the other places where business is conducted.

The Supreme Court decision that provided that steps used to determine the principal location of the business also provides the IRS with another tool with which to deny home office expense deductions. Quite simply, the Court noted that, in some situations, after applying these two steps, the conclusion may be reached that the individual has no principal place of business.

Fortunately, most spare, part-

Gross income		\$25,000
Home Office expenses:	Total	Home Office Portion
Interest & Property Tax	\$8,000	2,000
Insurance, Maint.,		
Utilities	2,000	500
Depreciation	6,000	1,500
Total home office expenses		4,000
Expense allocable to the business, but not allocable to home office use (e.g., supplies, wages, advertising, etc.)		24,000
Total expenses		\$28,000

Table 1

any business carried on or as a place of business that is used by patients, clients or customers in meeting or dealing with the taxpayer in the normal course of business. The exclusive use test or requirement is not met if

at each business location. Thus, if the nature of the business requires meeting with customers or clients, the place where the contact occurs must be given great weight.

time, or home-based business owners have a specific area of their home that is used solely for the purposes of carrying on a trade or business. However, even with a qualifying home office, studio or shop, there is a limit

to just how much that may be claimed as a tax deduction.

Under our tax rules, the home office deduction is limited to the total income from the activity — reduced by any expenses of that activity that may be deductible regardless of whether there is a qualifying home office. In other words, regardless of whether a home office exists, such expenses as taxes and mortgage interest may be deductible. With a home office or other dedicated business related work area, a portion may be deductible as a home office expenses and the balance as a personal itemized deduction.

Any deductions disallowed because it would create or increase a net loss from the business may be carried over to future years, subject to the same limit in the carryover years.

To illustrate, consider the case of John Doe. As a full-time teacher, John also operated a business in which a qualified home office is used. We'll assume that 25 percent of the general expenses for the dwelling unit are allocable to the home office. The figures would then look like those in Table 1.

Our entrepreneur/teacher must apply both the deductions allocable to the business and the deductions for taxes and interest allocable to the business use of the home (\$26,000) against the total income from the activity (\$25,000) in order to determine the limitations of the deduction. Because the limitation amount (negative \$1,000) is zero or less, the entrepreneur/teacher has a business loss of \$1,000 and may carry forward the unused \$2,000 of expenses to a succeeding year — again subject to the limitation.

There are many of us who may be employed by a large company, telecommuters and even those who are employees of their own home-based businesses (or other businesses), all of whom maintain a home office. Employees are permitted to claim a tax deduction for home office expenses — albeit limited and subject to the restrictions and ceilings placed on personal itemized deductions.

In order for employees to qualify for the home office deduction, they must meet the requirements already mentioned. In addition, the exclusive use of the home office must be for the convenience of the individual's employer. And that doesn't mean renting the home (or a portion of it) to the employer. The IRS and the courts have frowned on this tax dodge.

Generally, an employee's home office expenses must be taken as a miscellaneous itemized deduction subject to the two percent floor on

Schedule A of Form 1040. Those doing business as sole proprietors, of course, can use Schedule C of Form 1040 (Schedule C-EZ may not be used).

On a more positive note, our tax rules permit individuals, employees or small business owners, who use their homes as their principal place of business to deduct transportation expenses that would otherwise be classified as nondeductible commuting costs. Unlike someone who must get up and commute to the place of

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business, the employee with a home office or an entrepreneur using the home as a principal place of business, is permitted to deduct the cost of transportation, that is, going from that place of business to a customer's or client's office or place of business, or merely running business errands.

One warning about substantiating any expenses for home office. In order to claim any tax deduction, a Midnight Engineer must be able to prove that the expenses were, in fact, paid or incurred. According to the IRS, the following expenses which are deemed particularly susceptible to abuse, must generally be substantiated by adequate records or sufficient evidence corroborating the taxpayer's own statement: expenses related to travel away from home (including meals and lodging), entertainment expenses, business gifts and expenses related to the use of so-called "listed property" such as cars and computers.

That's right, not only must the portion of the home used exclusively

and regularly as a home office, the computers used in that home office must also meet the tests required of "listed property," property that may be subject to abuse of our tax rules.

The availability of depreciation deductions for "listed property" is restricted. This term embraces automobiles and other forms of property that lends itself to personal use (airplanes, trucks, boats, etc.) especially computers and peripheral equipment, cellular telephones and similar telecommunications equipment.

Unless this listed property is used predominantly for business (i.e., used more than 50 percent for business), depreciation deductions must be determined using an alternative method. These rules also apply to any portion of the cost of purchased "listed property" that the individual chooses to expense or immediately write-off under Section 179 of the tax law. Thus, if the more than 50 percent use test for "listed" equipment is not satisfied in the year the property is placed in service, the property will

not qualify for the first-year expensing election.

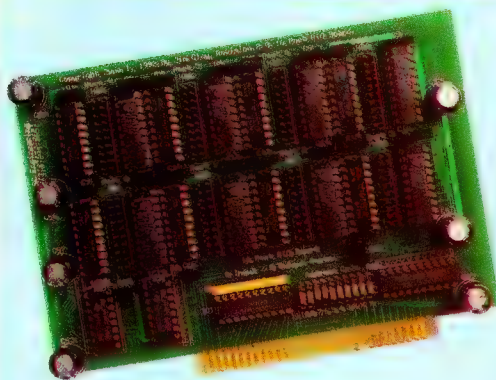
A Midnight Engineer is denied a business deduction for basic local telephone service charges on the first phone line in his or her residence. Additional charges for long-distance calls, equipment, optional services (e.g., call waiting) or additional telephone lines may be deductible home office business expenses.

The Republican "Contract With America" proposes a number of specific tax measures that may or may not become a reality in 1995. In the meantime or regardless of whether that loosening of the home office expense rules becomes a reality, everyone can benefit from the existing tax deduction for the use of a qualifying home office or other dedicated workspace. All that is required is to follow the rules.

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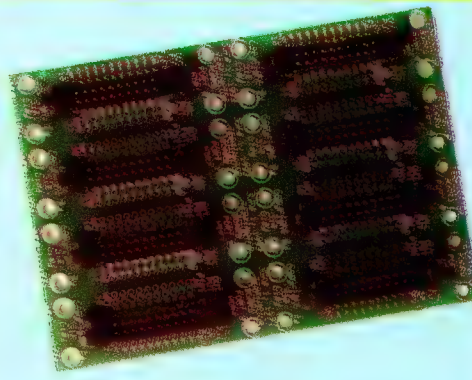
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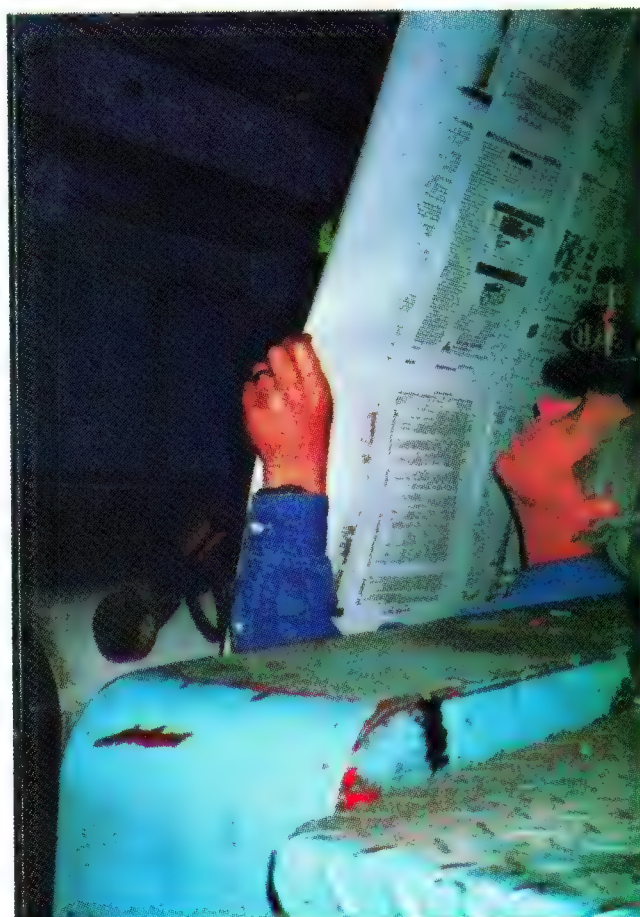
I was rewarded with DC output. The 50hp DC motor runs and the pot on the console varies the speed from zero to about 1500 RPM.

For the next 10 days, my father and I have another wonderful mechanical adventure. We position the oven, install the driveshaft down the back of the press, hook up the folder, bolt the motor to the floor, thread the paper through it all, and turn it on. Not only does the whole thing run, but the folder actually folds 16-page signatures in the same fashion as the current layout of ME!

As exciting as it was, we were running out of time. Not only was this issue becoming almost fatally late, but the printing company in Denver called with news that my paper was in and they would run me as soon as I could get there. Before I put my father on the plane back home we decided to try putting a little ink on paper. We hooked up the water solution on press unit #4 and "hung" (pressman talk for installing) the test plates that the Denver printing company was nice enough burn for me. There was still ink in the wells of unit #4 — it must have been almost a year old. My father scraped the scum off the surface of the ink and we cranked up the press.

The ink was so old and thick that it took a while before it worked its way through all the rollers and onto the printing plates, but as you can see from the photos, it worked!

So, again it was time for my father to go back home and for me to do another issue. Here's looking forward to printing the May/June issue! — **WEG**



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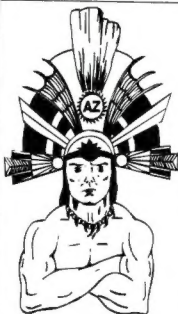
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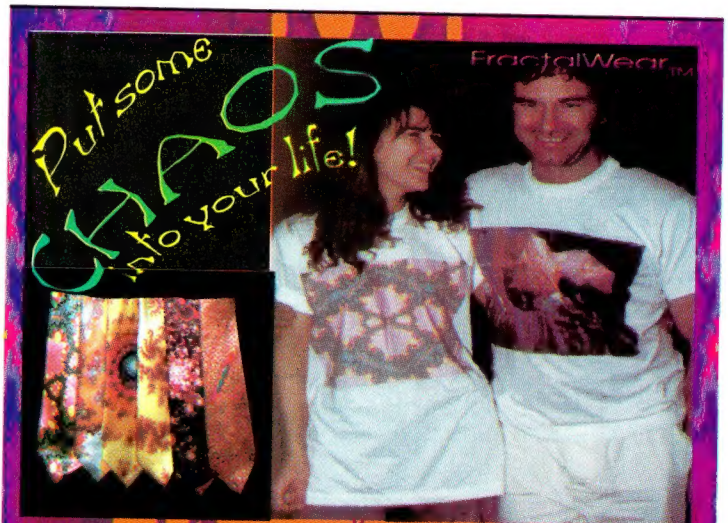
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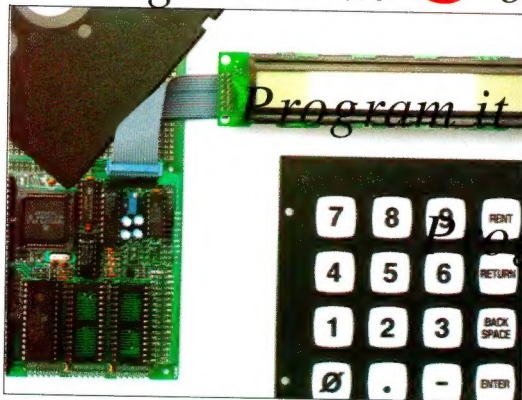
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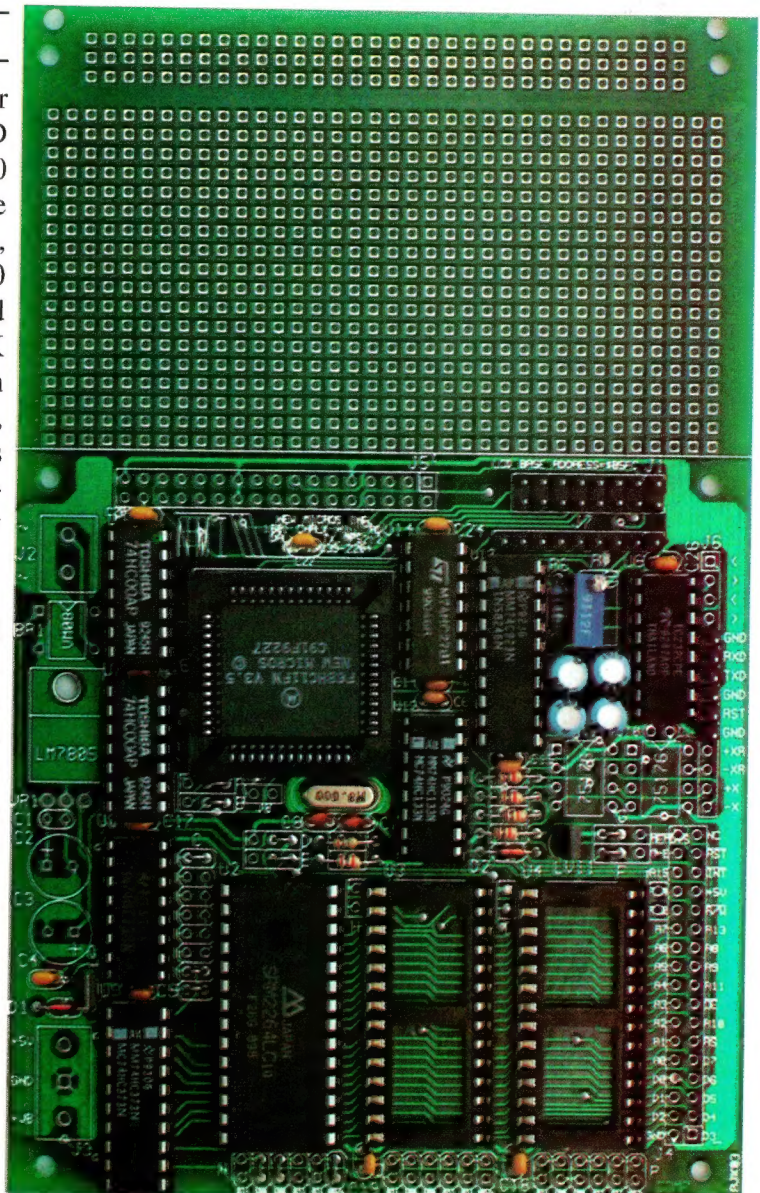
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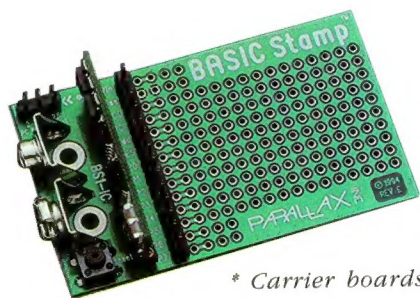


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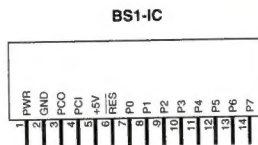
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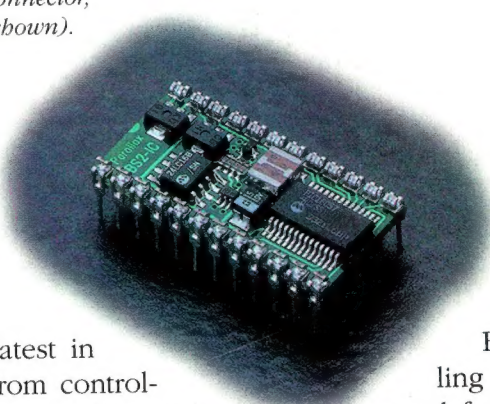
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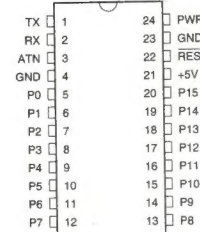
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